PERITUM
AGRI INSTITUTE HARVEST THE FUTURE

LEARNER GUIDE

LIVESTOCK FARMING

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Intro to the Module

A farmer must consider the following points in planning his production unit:

- Availability of feed, quantity and quality.
- The type of animal and its state of health.
- Creating a stress-free environment.
- He must have knowledge and skill of feedlots and practices.
- Knowledge of animal health and handling skills.
- He must be able to identify certain behavioural patterns and rectify problems if they occur.
- In this module we will work with you through key concepts of each of the above mastering the basic principles of livestock farming.

Part 1: Feeding Animals

In Part 1 of this module we will introduce learners to the basic concepts used in animal nutrition, maintaining, preserving, modifying and enhancing the nutrient value of animal feeds and to follow the correct feeding practices. We will also consider different feeding systems and work through principles for save storage of quality feed. We will cover the following topics.

- Understanding the nutrient, principle ingredient and feed groupings
- Understand different feeding systems including intensive, semi intensive and extensive systems
- Feed and water quality
- The Correct feed storage procedures
- The recording and reporting on levels of feedstock
- How to mix feed according to formulation
- Know how to identify and deal with Abnormal feeding behaviour
- Calibration of weighing equipment for livestock
- Weighing procedures to determine livestock mass
- The handing of animals during the weighing process
- Feedlot feeding rations and blends
- Feedlot feed Supplementation
- Feed loading and distribution
- Trough requirements for cattle
- Feedlot cleaning

Learning Unit 1

Animal Nutrition

What is nutrition?

Animals eat to supply the tissues with the nutrients required to fuel physiological processes of maintenance, growth, fat deposition, lactation and work.

A common definition of nutrition is:

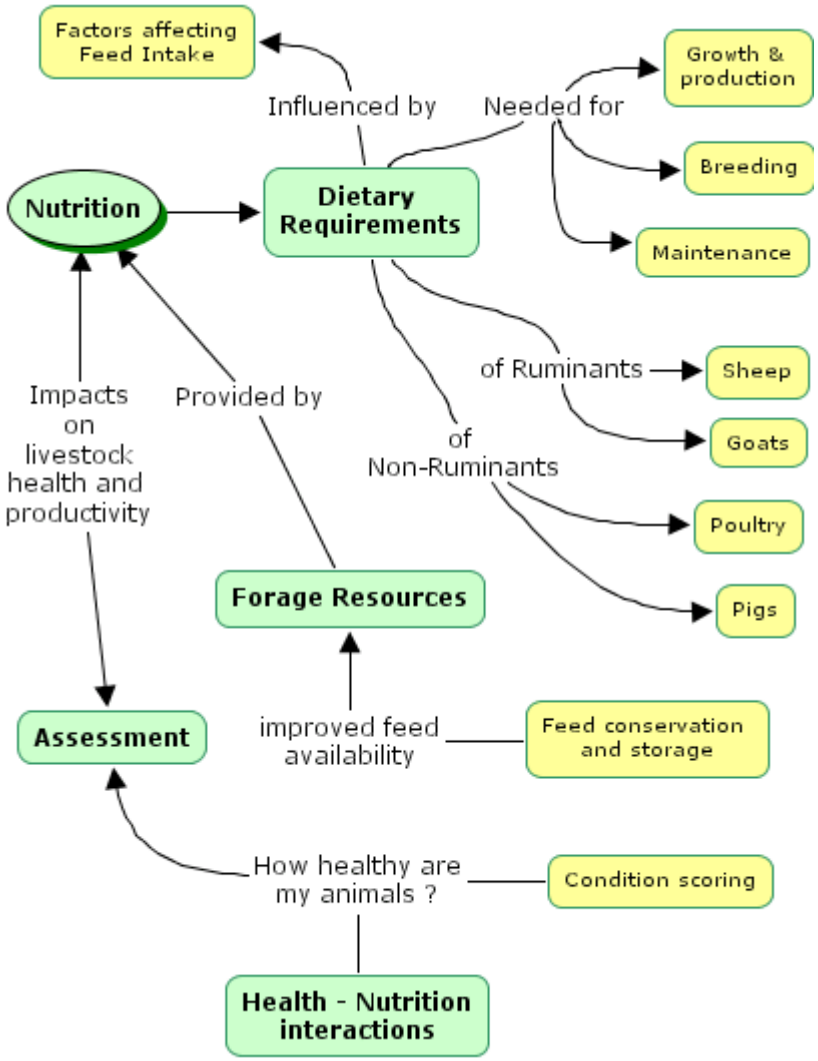
"*The process of nourishing or being nourished, especially the process by which a living organism assimilates food and uses it for growth and for replacement of tissues*".

A textbook definition may be more like:

Nutrition involves various chemical and physiological activities which transform food elements into body elements.

Nutrition can also be seen as the science which interprets the relationships of food material to the functioning living organism.

The question of nutrition is fundamental to keeping livestock. Livestock farmers need to understand that the provision of an adequate diet and nutrition for their livestock may be a combination of naturally sourced food material and supplementary feed of some sort.



The single most important function a farmer serves in the lives of his animals is providing for their nutritional needs. A well-fed animal is more likely to be a healthy animal. Here is some terminology a farmer needs to understand.

Balanced ration: A ration that provides all the nutrients, in the proper proportions (including energy, fibre, protein, vitamins and minerals) for the animal's needs based on its age and its level of work.

Concentrate: The grain or grains being fed as part of the ration.

Dry matter: The mass of the ration or feedstuff if the water is "baked off". For example, a sample of mixed meadow hay might contain 85 percent dry matter, so your 60-pound (27.2 kg) bale of hay would actually weigh 51 pounds (23.1 kg) on a dry matter basis (0.85 x 60 pounds).

Energy: The part of the ration that is made up of sugars, fats and fatty acids and starches used by the body for muscle and nerve activity, growth, fattening and milk secretion.

Feedstuff: Any food intended for livestock consumption.

Fibre: The part of the ration that comes from cellulose and hemicellulose in plant matter; it is broken down in ruminants and horses to create additional sugars and fatty acids.

Forage or roughage: The hay or pasture portion of the ration.

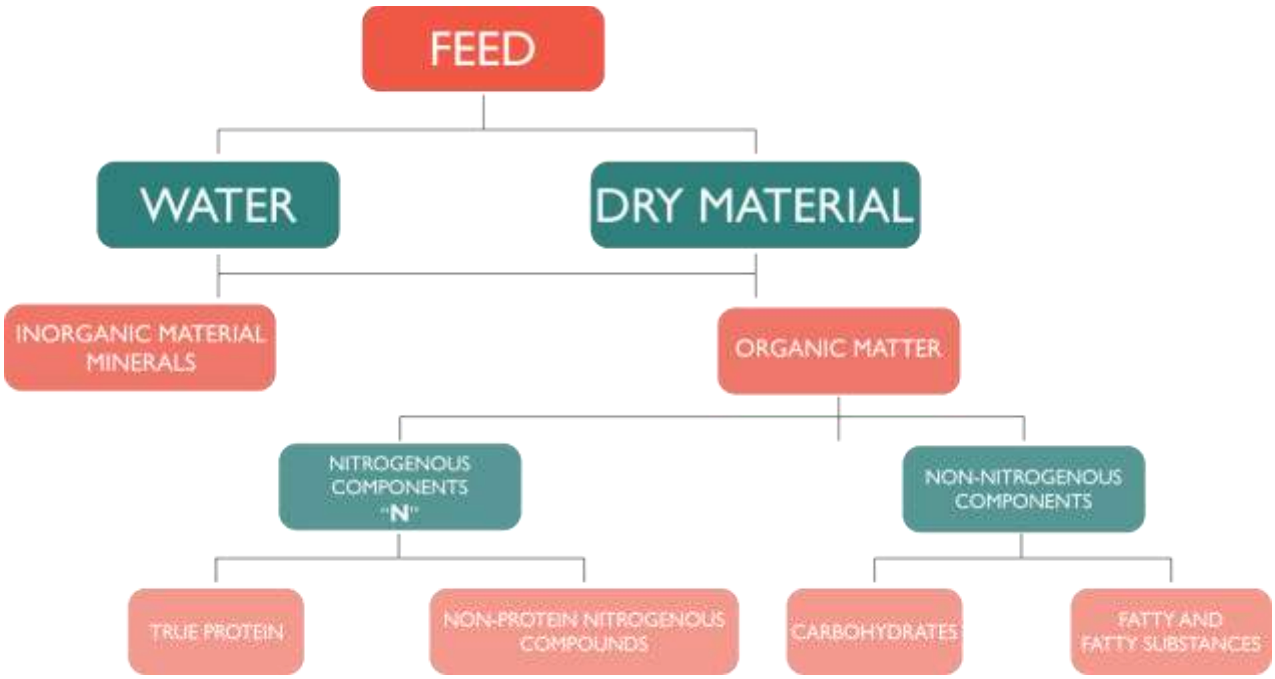
Protein: The portion of the rations that contains amino acids, which are required by the body for cell formation, development and maintenance, especially for muscle and blood cells.

Ration: The combination of foods in a specific diet, for a specific animal or class of animals, at any given time. Includes everything the animal is receiving.

Supplements: The vitamins, minerals or protein being added to the ration.

Composition of Animal Feed

Most livestock species are herbivores, so plants are their exclusive source of nutrition under natural conditions (though some commercial feed supplements may contain animal by-products, such as blood meal, dried whey or meat and bone meal). Pigs and poultry are an exception to the rule – like humans, they're omnivores and at least a portion of their natural diet is composed of animal mater (which includes insects!)



Whether the source is a plant or an animal, there are certain basic properties that all feedstuffs share. They are made up of three major components: water, and dry material which include organic matter and mineral matter or ash. If you took a sample of feed and ran it through a laboratory test to differentiate the three, you would weigh the initial sample. Then bake it at 120 to 150°F (49 to 66°C).

This first step would drive off the water and the difference between the initial weight and the dried weight would give you the weight of the water. The amount of sample remaining would be to burn this remaining sample at a very high temperature, which destroys the organic matter. When the sample is weighed a final time, the remaining amount is equal to the mineral matter or ash.

The *organic matter* can then be grouped into four parts: the carbohydrates; the fats and fatty substances; the proteins or nitrogenous compounds and the vitamins and minerals. All organic matter is principally made up of carbon, hydrogen and oxygen, though other elements may be present.

Carbohydrates

Carbohydrates from about three-fourths of the dry matter in plants, so they are the most significant component of feed. The carbohydrate group can be broken down into sugars, starches and fibre; the proportion of each varies according to the plant's age, environmental factors and the type of plant.

Starches are composed groups of sugar molecules strung together. All animals easily digest both sugars and starches, so they provide a relatively high feed value. On the other hand, the fibre component is made up primarily of lignin's and cellulose. The lignins are completely indigestible and the cellulose, which accounts for about 50 percent of the organic carbon on earth, requires bacterial fermentation to break it down into usable sugars and starches. All animals are able to ferment a small amount of cellulose in their intestines, but only the ruminants, such as cattle and sheep, are able to convert the bulk of the cellulose in their diet in usable sugars and starches.

Fats and fatty Substances

Like carbohydrates, fats and fatty substances are made up of carbon (C), hydrogen (H) and oxygen (O); however, the proportions of carbon and hydrogen are much greater than that of oxygen in fat. Despite our current fear of fat, it is an essential nutrient for all animals (especially young animals), including humans. Fat provides more than twice the energy than a carbohydrate provides, and it helps an animal maintain its body condition and temperature.

Protein

Proteins are essential for the development of all cell walls. They are also critical for forming muscles, internal organs, blood cells, hair, horns and bones. In most animals, protein account for 15 – 20 percent of the animal's weight.

Unlike simple sugars, which may contain as few as 20 atoms each molecule of protein is made up of thousands of atoms. In the case of proteins, the building blocks nature has developed to simplify construction are called *amino acids.* There are many thousands of amino acids, but only about twenty are critical for protein construction.

Vitamins

Vitamins are organic in nature (they burn off in the laboratory sample with other organic matter), but unlike carbohydrates, fats, and proteins, there is no rhyme or reason to their structure: Each one is unique from the others in its chemical formulation.

Vitamins are required in very small quantities, but deficiencies of vitamins in the diet can result in a wide range of diseases, including rickets, anaemia, and muscular dystrophy. At the same time, some vitamins, such as vitamin A, can be toxic if given in too high a quantity. Vitamin D deficiency is common in animals that are reared completely indoors; however, animals that spend at least some time regularly in the sun don't have this problem, because Vitamin D is synthesized by the body when exposed to sunlight.

Minerals

The mineral, or ash, component of feed is what remains after the laboratory fires the feed sample at a high temperature. Like vitamins, most of the minerals aren't required in very large quantities, but deficiencies cause a wide range of health problems, and toxicity can occur when there are mineral excesses in the diet. The minerals include such elements as sodium, calcium, phosphorus, and selenium.

Mineral deficiencies (or excesses) usually occur where soil mineral imbalances exist. Plants that are grown in a soil that is either too low or too high in any given mineral will reflect the soil imbalance in their tissue. The best way to learn about soil mineral levels on your farm is to have soil and forage samples run. Check with your local County Extension Agent, a reputable feed dealer, or your veterinarian for information on the general status of soil mineralization in your area. They can help you evaluate what types of mineral supplements will be best for your situation (your animals, your soil, and so on).

Mineral supplements are best fed free-choice. Animals are really quite efficient at controlling their intake of mineral supplements in order to meet their own needs. The best approach is to always have a free-choice plain white salt block and a free-choice trace-mineral block available. Another excellent source of vitamins and minerals that we put out is kelp meal. This dried sea plant provides a smorgasbord of vitamins, minerals and amino acids that all animals seem to love.

Composition Of The Bodies Of Farm Animals

Animal Weight	% Water	% Protein	% Fat	% Mineral
Calf, 100 lb (45,4 kg)	71.8	19.9	4.0	4.3

Fat steer, 1 200 lb (544 kg)	48.0	16.0	32.3	3.7
Dairy cow	56.8	17.2	20.6	5.0
Mature horse	61.9	18.2	14.1	4.7
Lamb, 80 lb (36.3 kg)	50.9	17.4	24.9	4.2
Pig, 100 lb (45.4 kg0	66.8	14.9	16.2	3.1
Pullet, 0.5 lb (0.3 kg)	71.2	20.8	3.5	3.6
Pullet, 4 lb 91.8 kg)	55.8	19.2	20.0	3.1

Chief Nutrients And Their Functions

It is necessary that you have a basic understanding of the main nutrient components of feed. The table explains the function of the main nutrient components of feed.

Functions of nutrient components:

Nutrient	**Function in the body**
Crude Protein	Building blocks for all protein containing material in the body – primarily muscle and connective tissue, milk, fibre, blood, certain enzymes and hormones.
Carbohydrates / Starches	Supplies the day to day energy for "running" the body's whole metabolism
Fats & Oils	Supplies extra energy during times in which the carbohydrates are too few; Stores surplus energy as body fat; Necessary for the function of certain vitamins and enzymes.
Crude Fibre	Contains some carbohydrates and starches that can be utilized by some animals. The roughage aspect of this fraction helps to keep the gut working properly.
Minerals	

Calsium [Ca]	99% of the Ca in the body is found in the bone and teeth. Essential for the normal functioning of the heart and skeletal muscles. Essential in the activity of the enzyme system. Also involved in the coagulation of blood.
Phosphorus [P]	80- 85% of the P in the body is found in the bone and teeth. Essential for the energy metabolism of the body. Essential for balancing the acidity of the body fluids.
Potassium [K]	Important in carbohydrate metabolism as well as nerve and muscle function. Also essential for the general balancing of fluids in the body. Urine contains high levels of K.
Natrium [Na]	Plays a role in transmission of nerve impulses and in the absorption of sugar and protein from the digestive tract. Essential in the balance of the body fluid and maintenance of muscle tone.
Chlorine [Cl]	Chemical component of digestive juices- it aids digestion. Essential in the balance of the body fluid and maintenance of muscle tone
Magnesium [Mg]	Activator for many different enzymes. Plays a role in balancing body fluids.
Salphur [S]	Essential for the formation of S-containing proteins. Wool contains high levels of S. Essential for hormone and enzyme functions.
Iron [Fe]	Essential part of the haemoglobin molecule that carries the oxygen in the blood. Is either part of or activates a number of enzyme systems.
Vitamins	In general, they are either a part of or help to activate the enzyme and co-enzyme systems of the body. Vitamins are essential for all aspects of energy transmission in the body.
Water	The body consists of between 75 and 85% water. Essential component of all systems in the body. It forms the ultimate mediator between the body and its environment.

Table of Nutritional Deficiencies in Livestock

	Decreased rate or cessation of	Rough coat, unthriftiness	Reduced appetite, anorexia	Decreased milk production	Emaciation, loss of mass	Dead or weak offspring	Stiff joints, lameness	Pica	Impaired reproduction	Collapse or death	Fragile, weak or fractured bones	Anemia	Diarrhoea	Muscular unco-ordination	Decreased phosphorus in plasma	Staggering gate	Convulsive seizures	Straight pasterns	Craving for salt	Suppression of oestrus	Goitre	Day or night blindness	Decreased Vit A in plasma	Shy breeding	Watery eyes, nasal discharge	Secondary pneumonia	Decreased calcium in plasma	Arching back	Tetany	Oedema	Enlarged joints and bowed legs
Energy	X	X		X	X				X	X																					
Protein	X		X	X	X	X														X											
NaCl	X	X	X	X	X			X		X									X												
Calcium	X	X	X	X		X	X		X		X															X					
Phosphorus	X		X	X		X	X	X	X		X				X																
Iron	X	X	X			X						X		X																	
Copper	X	X	X			X		X				X	X	X				X		X											
Cobalt		X	X	X	X			X				X	X																		
Iodine		X				X															X									X	
Vitamin A	X	X			X	X	X		X	X			X	X		X	X					X	X	X	X	X					X
Vitamin D	X		X		X	X	X				X				X	X	X	X									X	X	X		

Animals Can Be Grouped According To Feeding Class

The next table explains the feeding groups (classes) of animals and the type of animals in the group as well as an example of the feed they normally consume.

Table . Feeding groups of animals

Feeding class	Animal type	Examples of feed
Herbivorous Ruminants Herbivorous Monogastric animals (Equine family)	Cattle, antelope, sheep, goats. Horses, donkeys, rabbits.	Plant material, grass, bushes and shrubs. Plant material and some concentrates like grains.
Omnivorous Monogastric	Pigs Domestic and Wild poultry.	Plant material, roots, meat, and insects, fish.
Carnivorous	Lions, dogs, cats, crocodiles.	Meat, fish.

Feeds Can Be Grouped According To Their Origin

Feeds can be grouped according to the general origin and appearance or the way it was processed. Animal feed can be fed in different forms. It may vary from natural pastures to complete feeds and from supplements to natural veldt.

The table below explains the different feed grouping with examples and description of the feed.

Feed grouping	Description	Examples
Natural vegetation and veldt	Plants and grasses that grows naturally.	All indigenous and naturalized grasses, shrubs, forbs, sedges, trees, etc.
Cultivated pastures	Plants that are sown regularly (annually or at specific intervals) by man after lands have been (usually) mechanically prepared.	Rye grass, kikuyu, oats, Lucerne, cereals, various legumes, Smuts finger grass, kweek, etc.

Hay	Plant material, usually in the early stages of seed setting that has been mown, dried and baled	Lucerne, Oats, Rye grass, etc.
Silage	Plant material, cut at various stages, that is fermented in an air-less environment (silage pit or bale)	Oats, maize, wheat, Lucerne, legumes, etc.
Straw	The baled stalks and chaff residues resulting from the seed harvesting process.	Wheat, oats, maize, bean.
Dry concentrates	Usually the seed component of the plant.	Maize, wheat, oats, cottonseed, Soya beans, lupines.
Algal and bacterial cultures	Dried algae and / or bacteria	Usually a feed supplement e.g. brewer's yeast.
Animal products	By products from animal processing plants.	Bone meal, blood meal, carcass meal, chicken manure, fishmeal, fish oil.
Complete feeds – well balanced.	Pre-mixed feeds from a feed factory or on farm mixing.	Complete dairy meal, Calf meal, Lamb fattening meal, and Pig growth meal.
Supplements.	Feeds that are offered in addition to other feedstuffs to supplement the diet.	Salt / mineral / protein / energy licks; molasses; Vitamin / Enzyme supplements.

Feeding Strategies Can Be Grouped According To The Feed Utilization

The next table shows the different ways in which an animal can utilize its feed.

Table : Different ways of feed intake.

Way of utilization	Animal type	Examples of feed stuffs and use thereof
Extensive grazing	Game, beef cattle, sheep, goats, angora goats and horses.	Natural vegetation and veldt consisting of grass, shrubs, Karoo veldt, small trees etc. Are used whenever the animal graze or Browse.
Intensive grazing	Dairy cows, mutton sheep, horses, chickens and sometimes pigs.	Cultivated pastures, crop residues, provided by the farmer.
Zero grazing	Feedlot animals, dairy cows, chickens and pigs.	A variety of feedstuffs are fed to animals that have no other source of feed available. In most cases the diet is balanced to supply required nutrients.

Extensive Feeding Systems

The basic principles of an extensive production or feeding system is the following:

- Low input from management.
- High degree of self-sufficiency of livestock.

Livestock in an extensive feeding system is normally free grazing or browsing in a camp or pasture and no additional feedstuffs are provided in addition to the natural vegetation of the veldt. The only component supplied by management is good quality drinking water. Livestock is regularly moved to different camps to prevent overgrazing of the veldt. Dry-land systems with no irrigation of the veldt are normally the case.

Where there is a shortage of nutrients in the consistency of the natural vegetation a producer often provides a lick to compensate for this deficiency. This normally includes a protein and micro-supplement lick.

Semi-Intensive Feeding Systems

The principles of this kind of system is the following:

- A higher input level of management is required than with the extensive system but lower management than with intensive feeding systems.

- The animal's nutritional needs are met by 50/50 ratio between free grazing and feeding supplied by management. Normally the animal takes in enough roughage when browsing or grazing and the concentrate part of its diet is supplied as an additional feed. In the case of semi intensive systems, the grazing can differ from natural veldt to irrigated crops.

This type of feeding system is used in many production systems in South Africa.

Intensive Feeding Systems

The principles of this kind of feeding system is

- High input from management.
- Low level of self-sufficiency from livestock.

This type of system is normally used on dairy farms and feedlots and requires a high degree of input from management.

Management must provide both the roughage and concentrate parts of the balanced diet of the animals and this requires careful management skills as animals can easily be underfed, overfed or poisoned.

Every animal is different and all the animals in a group won't necessarily have the same nutritional requirements. Furthermore, the production outputs of some animals are much higher than that of others. Producers had to overcome this problem because it is not cost effective to feed the group to the requirements of the animal with the highest or lowest nutritional requirement within the group. It is now possible to feed every animal in accordance to its individual need and production ability. This method ensures a more feasible input-output ratio.

Learning Unit 2

Correct Storage of Feed

Animal feed is the one item that needs to be stored well, or it spoils. Storing hay to maintain its quality can be done in several different ways; the main thing to remember is that you want it covered. Tarps work and they're cheap, but they aren't a good long-term option. They tear, or blow away, unless very well secured in the first place; and sunlight eventually rots them, so they only last a season or two. One thing that can help is weighing tarps down well with old tires or blocks, or using tent stakes to tie them down. When using tarps, don't tightly enclose your whole pile of hay, or any moisture that is in the bales will cause them to rot in no time. Hay needs to have some air movement in and around the pile. Small hay piles benefit from being stacked on wooden pallets; this keeps soil moisture from ruining the bottom bales.

If you are dealing with large quantities of hay, a pole shed with just a roof, or a roof and one wall that blocks the predominant wind, protects hay well yet lets the air move around it. These structures are also relatively inexpensive to build. Hay that is being stored in any type of enclosed structure must be adequately dry, or it may start on fire. As the hay cures, it heats up, and sometimes it can heat up enough to spontaneously combust!

Livestock kept with grass-farming strategies don't generally need grain in such large quantities that bulk storage space is necessary. The best way to store the small amounts of grain is in garbage cans or 55-gallon (208 l) drums. (Metal or plastic is fine, but make sure the drum contained food-grade materials before: You don't want to poison your stock.)

As with hay, grain must be well dried before it goes into storage. Dampness breeds mould (and possibly mycotoxins) and fire. Grain or premixed feeds that are being purchased from a reputable feed dealer should always be adequately dry, and most of the time area farmers whom you buy from directly won't be selling you wet feed. But when you buy grain at harvest time, make sure the grain has been tested for moisture. Most feed stores can provide this service, or you can test your own sample.

Haystacks covered with a tarp.

Losses If Feed Is Not Correctly Stored

Quantity Losses	Quality Losses
• Birds and rodents will eat the feed or, carry it away. • Loose roaming animals might eat the feed. • Human theft. • Fire could destroy feed that are not stored away. • Insects can turn grains into dust. • Wind blows loose meal away.	• Birds, rodents and other animals eating freely will contaminate the feed with a danger of disease transmission to livestock. • If the feed gets wet, it will become mouldy and is then dangerous to feed to pregnant animals. It is likely that it will need to be discarded or used to make compost • High temperatures can turn oily / high fat feeds rancid. • Open containers of molasses attract rodents that may fall into it and drown. • If feed storage is such that the identity of the feed / mix is lost, it means that the feed may have to be discarded if it contains potentially dangerous substances such as antibiotics or urea • Always work on a FIFO (First in - first out) basis, so that feeds do not become too old.

What Can Be Done To Ensure Proper Storage Of Feeds?

- Ensure that feed storage areas are waterproof.
- If feed is stored loose, ensure that area is protected from wind, rain and pests/loose roaming animals.
- Store high cost feeds / supplements that can easily be loaded, in an area that can be safely locked.
- Small quantities of feed can be stored in plastic bins or drums.
- Make sure that fire control apparatus is available and working.
- Stack bags / bales in such a manner that cats can get to the rodents, but that the rodents do not have "nice" hiding places.
- Ensure an active rodent control program (use cats, dogs, baited traps, eco-friendly poison).
- Always keep stock control sheets up to date

Apply Stock Control And Records Of Animal Feed In Storage

As feed often makes up to between 60% and 70% of the costs of a farming operation, it is critically important that it is correctly stored and used. It is very important that you make sure that you understand the control of feed on a farm. The farmer must always know the rate of the feed-flow on the farm. In other words, the farmer must have full control of the use and supply of feed on his farm. Keeping that in mind, it is important that the people who practically feed the animals on the farm must regularly report to the farmer or manager on the use and stock of feed.

Keep the following records:

- All feeds that are regularly stored should appear as an item on a stock control sheet. Before any new consignment of feed arrives, the existing levels of stock need to be controlled and an area prepared for the new consignment. Do not load fresh food on top of old food.
- All consignments of feed delivered to the farm need to be checked, as it is off-loaded on the farm. Check that the label corresponds to that on the delivery note. Check the condition of the bags (are they torn, punctured or badly worn?) Count / weigh the feed as it is off-loaded and jot the actual number /weight received down next to the amount on the delivery note. Make a note on the delivery note of any problems encountered. Once the entire load has been checked, the delivery note is signed and a copy is kept for the farm records.

- Whenever feed is taken out to be used in a mix or to be fed, the amount of stock that is removed from the store needs to be jotted on the stock control sheet.

The stock levels need to be controlled on a regular basis and maintained at a specific level.

How to control stock levels:

- Take the last actual count / weight of bags / bales / feed.
- Add all deliveries / new mixes made.
- Subtract all stock used.
- Jot down figure calculated - this is the Expected Stock Level.
- Now do an actual count / weigh and compare it to the expected stock level.
- The Stock Control sheet indicates what the minimum acceptable level of every item is. Once stock levels have been checked, follow workplace procedure to order stock that is below the minimum required level.
- Whenever stock levels are checked, a check on quality can also be done. Check e.g. for signs of mould, rancidity, wet, dung contamination, separation of components.
- Report any signs of quality problems on the stock control sheet.

Feed Processing For On-Farm Use: Feed Mixing

The most abundant animals farmed with are the ruminants. Ruminants make out a large group. Cattle, sheep, goats and most antelope fall in this group. Farmers may farm extensively with cattle, sheep and goats, but in the case of dairy cattle and sometimes, sheep and goats intensive or semi-intensive farming is practiced. In cases of intensive farming, the ration fed to the animals must include all the nutrients needed.

Extensive grazing pastures may also need extra feed in drought times in the form of licks. The farmer can feed already mixed feed or he can mix his own. Pig and poultry farmers feed concentrates to their pigs or chickens. Dairy cattle or beef cattle and sheep farmers will feed roughage as well as concentrates.

It is very important that farmers mix their rations in the correct way. The following must be kept in mind when mixing feeds and licks.

Very expensive modern machinery is available to mill and mix feeds. Unless very large quantities of feed must be mixed, hand mixing is quite effective if certain principles are adhered to.

The equipment required must include a scale, shovels or spades and a floor large enough to do the mixing on. Although a well-packed earth floor can serve, a cement or concrete mixing floor is better.

The manner in which you mix is very important. This is best achieved by the following procedure:

- The major constituent of the mixture is spread on the floor. The other constituents are then spread in layers over this first layer until all the components have been added. Shovels or spades are then used to mix the ingredients; much as concrete mixing is done. The people doing the mixing start at the edge of the layered ingredients and, using spades or shovels, turn the feed over with a mixing motion and move the mixed feed to one side, while at the same time heaping it. The mound of feed is then moved while continuing the mixing motion. Moving the mound back and forth is repeated two or three times, after which the feeds are usually well mixed.
- Where very small quantities of an ingredient must be evenly distributed in a feed *e.g.* ionospheres, making a premix has been shown to make it possible to distribute the relevant ingredient very evenly throughout the mix. Making a premix involves taking a small amount, say a bucket full, of one of the ingredients of the diet (maize meal is usually taken, even if it is not one of the ingredients of the mixture) and the additive mixed well into this bucket full of meal. When all the other ingredients have been spread in layers on the mixing floor, the premix is carefully sprinkled over the top, while taking care that all the feed is covered with the premix (almost like spreading salt over a plate of food). Mixing proceeds as described above.
- Ingredients must always be weighed out on a scale that has been checked for accuracy. Mistakes with feed mixing are usually caused by the addition of incorrect quantities of one or more ingredients. Care must be taken to ensure that all the ingredients are added and that they are added once only.
- Ideally, when a new batch of an ingredient is obtained, it should be chemically analysed and checked for toxins. This is often not feasible in the farm situation, especially where small quantities are involved. However, farmers should examine feeds carefully. Often contaminants can be seen. Where feed has become wet, it must be examined for the presence of fungal growth. Mycotoxins are produced by fungi which inhibit animal growth and can cause animal deaths.
- Some modern feed additives are dangerous to use because they are poisonous or toxic. Farmers are well advised to read the instructions provided with additives. It can happen that a company revises the chemical composition of an additive. Unless instructions are read, farmers will not be aware of changes in the product and should the additive be made more concentrated, adding the same quantity could cause major losses.

The mixed ration should look the same throughout the bunk or in the self- feeder. While inadequate mixing can be a common problem, you can also mix too long in a vertical mixer thereby breaking down the necessary particle size required to ensure good digestion.

It is important that a well-mixed feed don't 'sort out' or separate. This can cause some cattle to receive an overdose of supplements whilst others receive none. Sorting out can occur due to differences in particle size and weight of the various feedstuffs. Ingredients that are added in small amounts, for example vitamins and minerals, should be mixed with one or two buckets of grain before being added to the mixer.

Vertical Grinder Mix

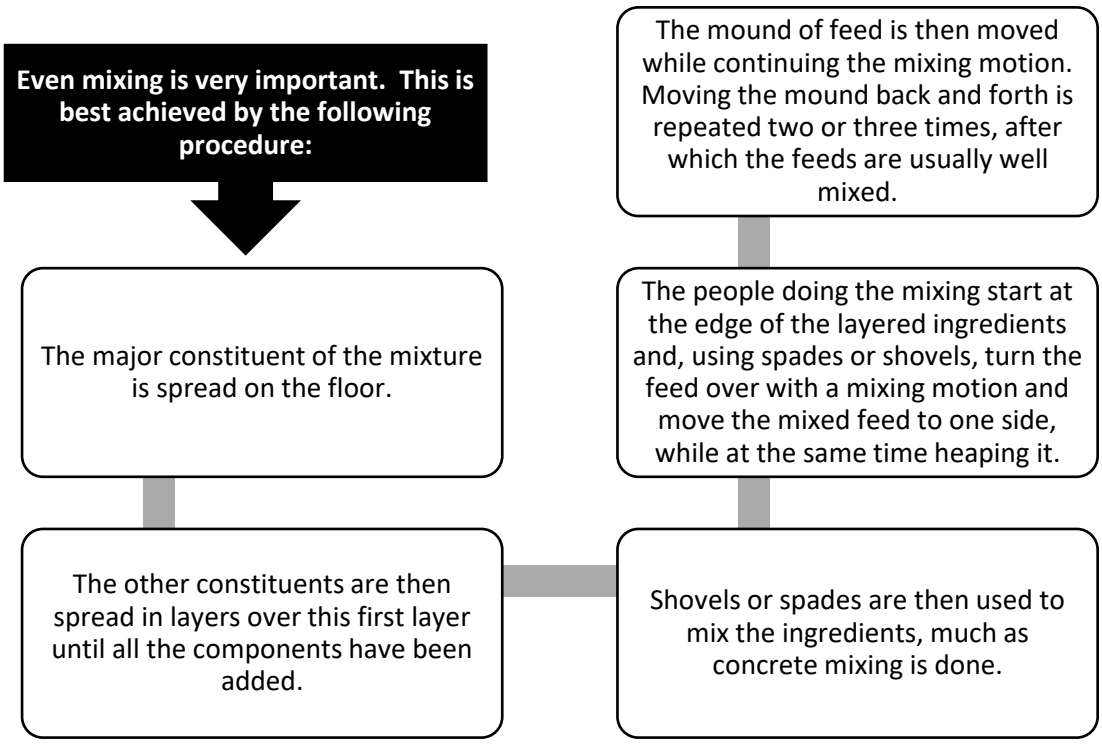
The following is a recommended method of adding supplements to vertical grinder mixer:

1. Add half the grain or other concentrate used.
2. Add the supplement premixed with grain.
3. Add the rest of the grain.
4. Add the roughage.
5. Mix for five minutes at the feeding site to eliminate separation occurring during travel to the feeding location.

Floor Mix

Very expensive modern machinery is available to mill and mix feeds. Unless very large quantities of feed must be mixed, hand mixing is quite effective if certain principles are adhered to.

The equipment required must include a scale, shovels or spades and a floor large enough to do the mixing on. Although a well-packed earth floor can serve, a cement or concrete mixing floor is better.



Feed ingredients should be mixed at regular intervals preferably daily to avoid spoilage. In some instance where cattle are fed twice a day it may be necessary to mix feed more than once per day.

Always remember that the best practice is only to mix enough feed for one feeding. If too much feed is mixed sorting out or separation can occur necessitating the need to remix feed thereby causing a breakdown on particle size.

Feed that are left over are also more likely to spoil and spoiled feed can cause sickness and loss of appetite in cattle thereby severely affecting the profitability of the feedlot enterprise.

Evaluate Feed Quality

QUALITY OF FEED

The quality of feed refers to its ability to provide in the nutritional needs of the animal and is measured directly by calculating the amount of feed in kilograms given to the animal and its growth in production.

The quality of a feedstuff is determined by:

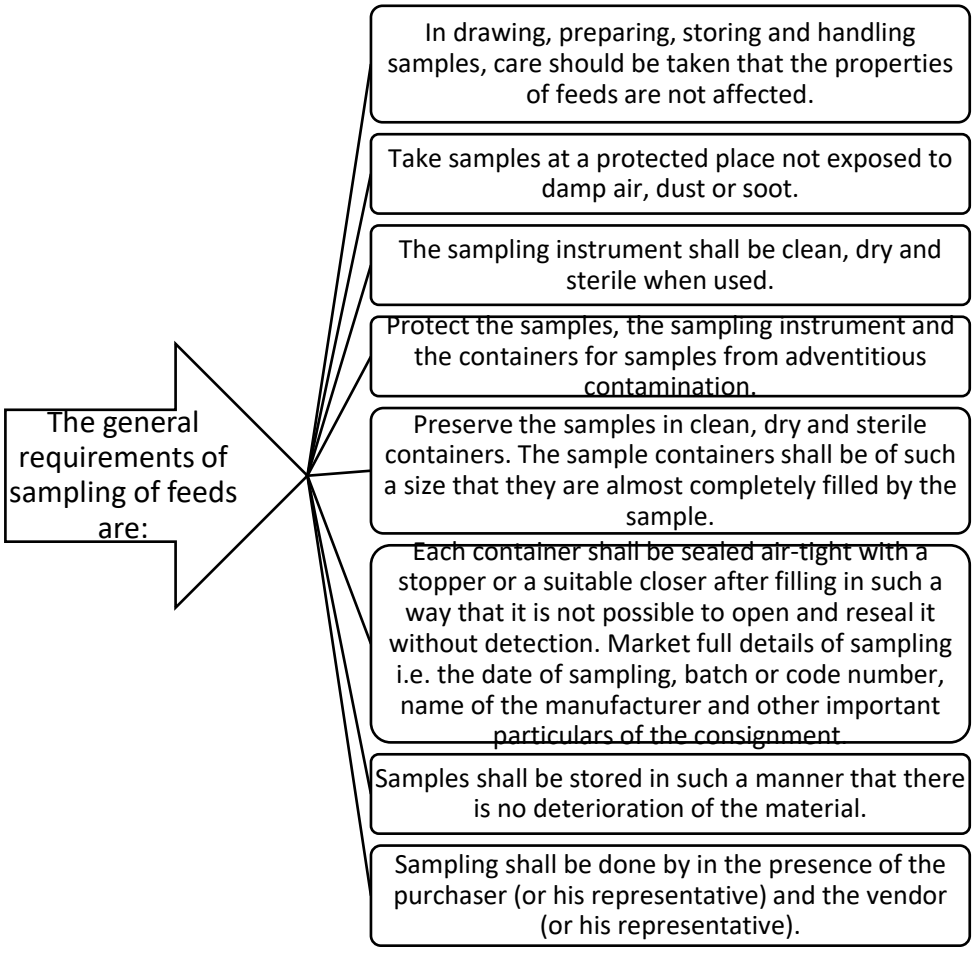
- The freshness thereof
- The form in which it is given to the animal
- Degree of contamination of the feedstuff
- The amount of digestible nutrients within the feed
- The correct balance between **concentrate and roughage.**

To assess the quality of a feed it is important not only to physically assess the feed but also to make sure that none of its ingredients can be harmful to the animal.

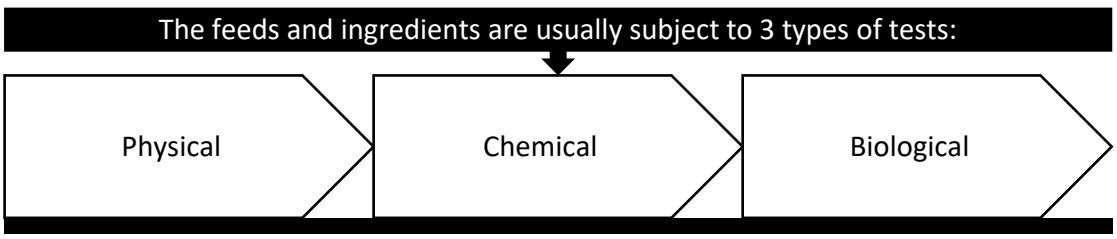
Where animals are fed it is important to carefully monitor the feed in the troughs:

- Make sure there is always fresh feed in the troughs as most animals in feedlots can afford to feed very selectively.
- Feed should be provided at regular intervals and in amounts that can be finished in a relatively short period of time. Production improves drastically when large amounts of feed is divided and given at regular intervals.
- All leftover feed must be removed at the end of each day.
- Remove all foreign materials from the troughs as this may block the animals digestive system.
- Troughs should regularly be disinfected to prevent spreading of disease.
- Troughs should be well positioned out of the elements to protect feed from rain. Some feeds like urea may become poisonous when it gets wet.

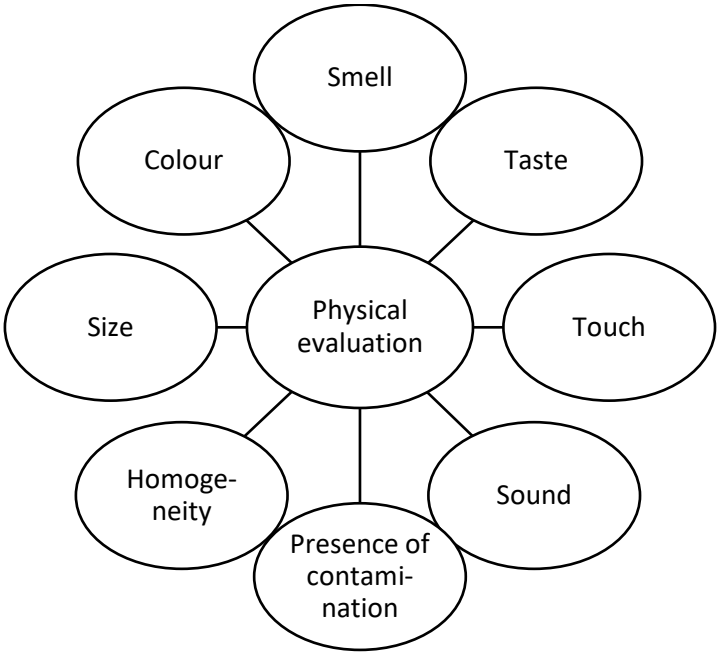
To ascertain that specific ingredient or feed blends meet those criteria we have to take sample of those feeds or ingredients that must be tested. In all cases, at least 10% of the packages should be sampled. A minimum of approximately 1kg should be collected from each load. All cores should be combined in an airtight container.



When assessing the quality of samples, we first have to identify the areas that can be tested to determine the quality of the tested samples. The following table gives a few examples of the test that can be conducted on feed blends and ingredients. These test can be quantified, in other words the results can be counted to give the feed blend or ingredient a quality rating.



Physical Evaluation Of Feed Quality



Physical evaluation is easy but rough in nature. One must be highly trained to identify the changes in the nature of the raw materials/feeds. Usually the following criteria are investigated:

- **Colour**: The appearance of the ingredient will reveal its quality. Any change in the colour of the feed ingredients gives an indication of the maturity of the grain, storage conditions, presence of toxins, and contamination due to sand, possible use of insecticides/fungicides which gives dull and dusty appearance. Orange to red colour of sorghum indicates high tannin content. Browning or blackening due to heat on improper storage reduces nutritive value. Black coloured fish meal indicates the rancidity of fish oils.
- **Size**: Size of the grains governs its energy value due to the proportion decrease/increase in seed and its coat. Smaller the grain lower will be the protein value in proportion to the hulls. To evaluate the cereals weight of a fixed number of grains usually 100 grains or fixed volume is taken. Higher weight indicates a higher protein value. This technique is called Test Weight.
- **Homogeneity**: The presence of contaminants like other grains, husks broken grains, weed seeds, infested seeds is looked for. In the oil seed cakes closer observation will reveal the presence of fibrous material, especially in de-oiled groundnut cake, the cake with hulls which contains nearly 20 to 25 % crude fibre can be visually identified. Clumps in mineral ingredients make them unsuitable for premixing.
- **Smell**: Smell is the next best indicator just standing near the stock itself will immediately indicate any difference in the normal smell. The feedlot manager should familiarise himself

with the normal smell of the ingredients, any change in the normal smell of the ingredients should be viewed with suspicion. A musty odour indicates the beginning of fungal contamination or boring insects. To detect rancidity in oil rich feed ingredients this is the best method. An odour of petroleum products is suggestive of excessive pesticide or fungicides. A leathery smell of meat indicates adulteration with leather meal.

- **Taste**: Each ingredient has a different taste, any change in the taste like bitterness in the grains, soya, sunflower oil meal and groundnut cake might indicate the presence of mycotoxins. The level of salt can be detected by tasting the ingredient and the feed. Bitter taste of rice polish indicates the rancidity of the fatty acids.
- **Touch**: Feeling the raw material will indicate the dryness. Chilliness indicates high moisture content. Clumps can be found out by inserting the hand inside the bag. The clumps may be due to high moisture content, improper storage, packing of fresh warm solvent extracted from meal, which crumble on application of light pressure. Clumps formed due to excess of moisture will be very hard. To evaluate rice polish, place about 25g of rice polish on the palm and close the fingers tightly and then open the fingers, the rice polish will become like a solid mass if the crude fibre level is below 12% if the fibre level is high the mass will disintegrate once the fingers are opened. Further pressure will be felt when the hand is closed in high fibre rice polish.
- **Sound**: Dry grains on pouring down or biting will produce sound of spilling coins.
- **The detection of adulteration or contamination**: The common contamination or adulteration in most ingredients is husk or sand. Winnowing is the best method to detect husk in feedstuff. Sieving can be done to differentiate contaminants based on particle size. To detect for the presence of sand a weighed quantity of the grain is soaked in water then by sieving with hand the grains that be separated. The remaining water if decanted the settled sand can be weighed and the level of contamination can be assessed.

Chemical Evaluation of Feed Quality

An analytical laboratory for the precise estimation of nutrient contents and contaminants is of utmost importance. Analyse the feeds for proximate principles. This indicates possible constraints on usage due to the presence of excessive content of crude fibre, fat or total ash. Low crude protein and high crude fibre (CF) levels of oil seed meals is indicative of adulteration with fibrous material. The high CF alone is indicative of adulteration with urea and or some inferior quality oil seed meals.

The amount of acid insoluble ash is a good guide to the amount of sand or other dirt which may be present. Fish meals are usually adulterated with sand during drying process.

It is also desirable to determine the free fatty acid content of oily materials as this will affect palatability due to rancidity of oils. The chemical composition or specifications of various animal feeds are laid down, which acts as guidelines for the suppliers, buyers and the users at farm level. Protein meals should also be analysed for their amino acid contents.

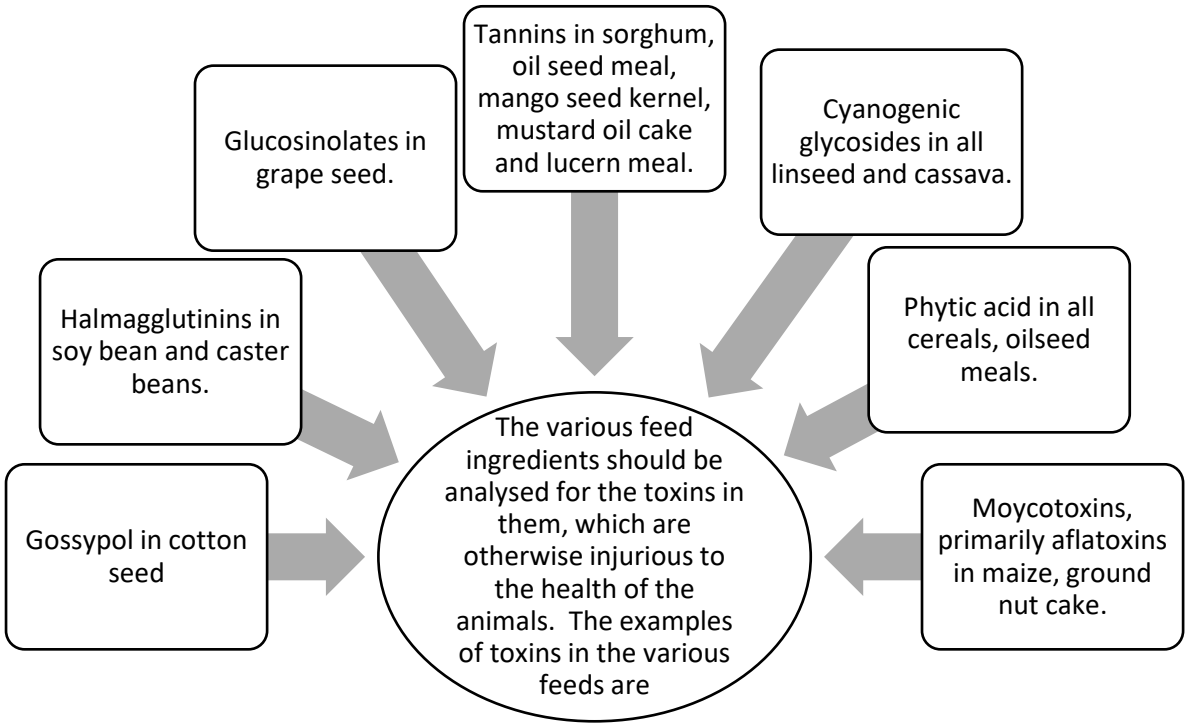
Ingredient specification

Ingredient specifications are essential in a feed quality assurance program. Specifications serve as the basis from which purchasing agreements are written, feed blends are formulated and ingredient inspections are performed.

Ingredient description and general nutritional specifications may be found in specifications for feeds and feed ingredients. Specifications of feeds must be as comprehensive as possible, realistic, must be transmitted to the seller. These are the measuring sticks to which the delivered material must conform.

Specifications are the foundation of a quality assurance program because the serve as an understanding between nutritionist, purchasing and production departments. A list of feed ingredients and their target nutrient level are presented as an example. Some analytical procedures are given to detect the various types of adulteration.

Toxins in animal feed



Ultraviolet screening is used whereby a greenish yellow fluorescence is observed when the sample is exposed to ultraviolet light to detect mycotoxins. One should get the best source of supply and one should have some idea of normal levels of toxicity which may be expected.

Biological Evaluation of Feed Quality

Biological evaluations of feeds involve the use of animals and specialised persons to conduct the digestion and metabolism trails on the various species of livestock. These methods are time consuming

Heat discharge and feed quality

Another important factor that is used when assessing feed is the heat discharge factor. Heat discharge is commonplace and takes place when the moisture content of ingredients is too high. A high moisture level in ingredients usually leads to fermentation of those ingredients and a by-product of the fermentation process is the release of heat.

Whilst feed and ingredients are assessed the presence of heat should be immediately reported to the feedlot manager or operator as this might be an indication that the feed is not suitable for use. It is always good practice to ensure that all staff involved in the mixing and distribution process of the feed should be trained to look for heat discharge in the feed and report it when found.

Water Quality

No Livestock Producer Will Ever Be Able To Sell A Good Quality Product If There Is No Clean Water On The Farm

The quality of drinking water is definitely one of the most important production factors and is often not considered when the topic of feeding systems is being discussed.

Good quality drinking water must always be available and accessible in any production system.

Care must be taken to ensure that water troughs are cleaned daily and it must be constructed in such a way as to not allowing livestock to damage it. In most parts of the country water is scarce and losses must be prevented. If shade can be provided it will ensure that the temperature of the water is always cool which can boost production during the hot summer months and it also reduces the growth rate of algae in the water supply

The most important task regarding water supply is the fact that it must be **continuous**. The producer must put in place infrastructure e.g. reservoirs, dams, purification systems and pipelines. To ensure the quality of the water stays the same, regular water sampling and analyses must be done. The infrastructure necessary for continuous water quality supply will differ for different farms but must ensure a good quality water supply and enough water to prevent shortages from occurring.

The best tanks for small critters such as sheep-goats, or for just a couple of bigger critters, are probably the newer rubber pans. They can be set up to run with an automatic valve, so you don't have to keep refilling them, but if they become fouled, they're quick and easy to dump and rinse. These tanks are great in freezing climates, because they can just be tipped upside down and stepped on – the ice simply pops out, even if the pan was frozen solid.

If you have a large herd of bigger animals, you'll need a larger stock tank, but again get the smallest one you can get by with so it will be easy to drain and clean. There are a number of brands out now that are made of rubber or hard plastic, so they won't rust out on you. If you do live in a severe freezing climate, the hard-plastic units will break if they freeze solid, though some are designed to work with an external heater. Try to steer clear of the style of electric stock-tank heaters that are suspended in the water; these are expensive to run, and if an animal chews through the cord it creates a major hazard for both animals and people.

Consider these alternatives for freezing climate:

1. Run a small trickle of water continuously – through this tends to make a major ice monster by the end of the winter.
2. Fill water tanks one a day during the coldest part of winter with just the amount of water that meets the animal's needs. The goal is for them to have all the water they need but to drink the tank almost dry each day. We successfully used this technique, filling the tank first thing every morning; our animals learned to come up and get a couple of good, long drinks as the tank was filling. With our size tank and our stock, we learned to leave the tank about half full after everybody got their first drink, so by late afternoon the tank was empty again.
3. Splurge on one of the newer insulated water-tank systems. Galvanized tanks are readily available and come in a wide variety of sizes and styles, but they do tend to rust out. Poured-concrete tanks can work for any type of livestock, but if you do pour a tank and pad, make sure to roughen up the pad surface so it won't be slippery for hooved animals. Provide a way to drain the tank for cleaning – or you may be manning the bucket brigade more often than you'd like.

POE Activity 1

POE Activity 2

Learning Unit 3

Abnormal Animal Behaviour During Feeding

Introduction

Now that you have learned about feed and the type of animal that needs a certain type of feed, we can look at abnormal feeding behaviour of animals. There will always be competition among animals when fed. Feeding is a time when a keen observer can clearly spot abnormal behaviour and reporting that to the supervisor early might save some animals lives or to make management decisions. Feeding time is also a time where the weaker or younger animals will find it difficult to compete with the stronger and older animal. Therefore, there must be enough feeding space or ration so that every animal gets its fair share. Feed intake is directly related to production levels. Supplying animals with adequate feed and water is critical for their wellbeing and production.

Feed Intake is Very Badly Affected if any of the Following Problems Occur

- Too little feed is made available. This leads to severe competition between animals and the younger and weaker animals always gets the least access.
- Lack of clean water. Feed intake will stop sooner than later if no water is available.
- Feed is contaminated with urine and dung.
- Feed contains foreign matter such as plastic, wire, string etc. Death may be the result from swallowing of these foreign objects.
- Spoilt feed left in feed troughs accumulates due to a lack of intake by the animals. This leads to the false impression that there is sufficient feed available.
- Feed is out of reach of animals or feeders are not distributing feed properly.
- Incorrect quantity or type of feed is offered.
- Feed is selectively eaten - certain portions are left.
- Feed space is so limited as to result in severe competition between animals - some animals having very little if any access to feed. This also leads to weaker animals being injured.
- Animals want to eat, but due to some physical problem is unable to do so (e.g. something stuck in the throat; smooth tongue; infections on the lips, tongue or gums; stasis of the gut; colic; bloat).
- Sick animals rarely exhibit a healthy appetite.
- Animals that are **on heat** usually do not eat much.

- Pain reduces feed intake.
- Stray voltage results in a low current being present in metal feeders. Animals exhibit low or erratic intake.

Routine Checks To Prevent Problems

In order to prevent any of the above problems, certain routine checks should be in place. For example:

- Actual feed intake should be calculated regularly.
- Automatic feeders should be checked daily for correct functioning.
- Feed bunkers should be cleaned at least once or twice a week - depending on how wet and perishable the feed is and how the feed bins are shaped.
- Feed bunkers should be checked twice daily for contamination and spoilt feed removed.
- Remove any foreign matter such as wire, string, plastic etc.
- In an intensive feeding system, water troughs should be checked twice daily to ensure that fresh clean water is always available.
- Animals should be fed according to a regular routine.
- Availability of feed in a grazing situation should be monitored daily.
- Salt licks should be limited, to prevent animals from over-intake if it is only irregularly supplied. This can lead to diarrhoea.
- Animal health should be monitored and any of the following symptoms immediately recorded and reported:
    - Diarrhoea;
    - Lameness accompanied by swollen cornets (laminitis);
    - Bloat;
    - Sweet smell on the breath of a ruminant (ketosis);
    - Sour smelling, yellowish dung in a ruminant (acidosis);
    - Swollen muzzle / muzzle;
    - Drooling from the mouth;
    - Vomiting;
    - Excessive weight loss or gain.
- Metal feeders should be checked for stray voltage from time to time.

POE Activity 3

Learning Unit 4

Livestock Mass

Weighing Animals

Before we can start weighing the cattle it is important that we know how to prepare the weighing facility that we want to use and that we know what weighing methods will be appropriate to the facility. Cattle are weighed using a variety of means the most accurate means of weighing cattle are the use of an individual electric or mechanical scale.

Weighbridges and group scale are more commonly used by abattoirs to determine the weight of the cattle on the hoof before they are slaughtered. A producer on the other hand needs to determine the weight of individuals in the herd in order to adjust his production practices to maintain maximum results.

Each farm and each type of scale will have its own particular set of procedures that will be related to the specific mass determining system being used. The most common method used and the most accurate are the use of individual electric scales and in this module we will look into the correct manner in which these scales should be used.

Individual electric scales are often portable platform scales placed within the crush. These scales are then used to weigh the cattle on individually as they pass through the crush. The information can then be either manually recorded using the ear tag as a reference or the information can also be stored directly onto a computer.

Benefits Of Weighing

To run a business efficiently you need to know your cost of production. Accurate weighing is an essential tool for calculating the cost live weight gain and these elements are inextricably linked.

For example, switching feeds may prove to be a false economy in the long term, because it may affect performance and lead to extended finishing periods and poor grading.

Without a precise knowledge of daily live weight gains, it will not be possible to gauge whether your ration formulations are helping or hindering your objective.

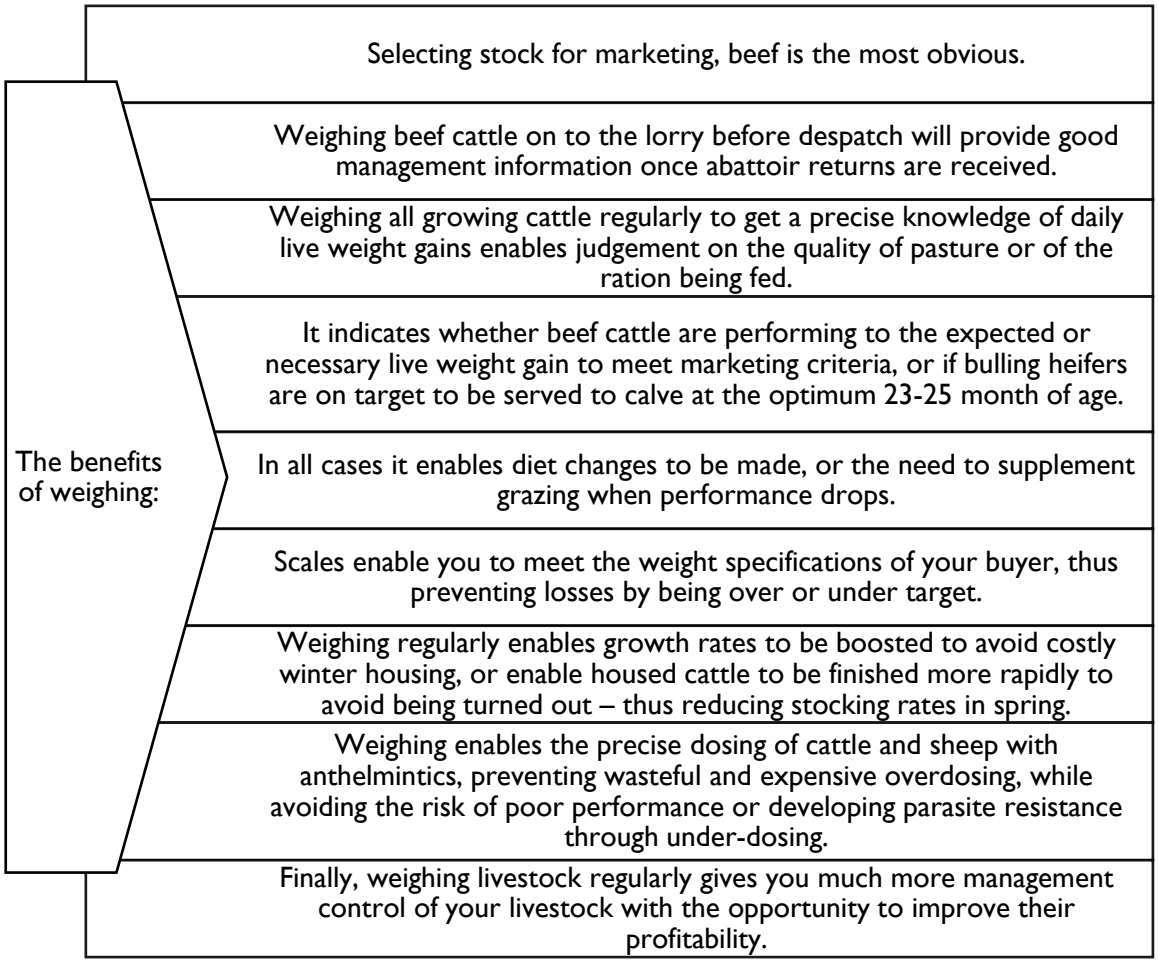
Your feed rep may tell you that a particular vitamin and mineral blend, will improve livestock performance. You can be certain that the investment is worthwhile if you are measuring growth rates.

Failing to meet the weight specification demanded by your customer may result in penalties which can add up to hundreds, or even thousands of pounds over the year.

Weighing finished cattle or sheep before sending a load to the abattoir is vital, as it enables you to monitor killing out percentages when you receive details back from the buyer. Every abattoir is different, and you might find that the type of animals you produce would achieve higher values elsewhere.

Whatever animals you are fattening; they will have a specific target weight. If you weigh regularly, you will be able to predict when this is likely to be achieved and it also enables you to pinpoint the correct time for ordering your next batch of stores.

Many veterinary medicines rely on dosages relating to animal weights. If your over-estimate individual weights and give too much of the product, you will waste money and risk livestock health. Conversely, you will also waste money and not see the full benefit of a product if you under-estimated the correct weight and thus the dosage.



Preparing The Facility

The Crush

The first area that must be looked at before weighing is the crush. The crush must be designed and placed in such a manner as to cause the least amount of stress to the cattle as possible. It is therefore important that the producer follow the general guidelines when constructing the crushes to be used in his farm.

The crush used for weighing cattle must also be as level as possible as the scale will have to placed and adjusted to the horizontal to measure accurately. Cattle that are stressed will also not stand still long enough on the scale to ensure that the weight measurement is accurate.

The Scale

The scales most commonly used to determine the mass of cattle are modified platform scales. Depending on the size and type of scales used the scale will consist of a platform placed on load censors, either four censors on each corner of the frame or six censors with an extra censor placed in the middle of the frame one on each side. This placement of the load censors necessitates the horizontal placement of the scale to obtain accurate readings.

Examples:

Weigh-bar scale	Scale with chute

Single animal scale	Portable scale

Scales must also be checked before use to ensure that they are clean and that no dirt or mud is trapped or interfering with the operation of the load censors. Although robustly constructed it is advisable that the calibration of the scale is checked before cattle are weighed and that the scale is calibrated at least every 12 months by the supplier or a professionally accredited company.

To check the calibration of the scale a weight of at least 50 Kg must be used. Place the weight alternatively on each corner, or load censor, of the scale and take a reading. If the reading differs greatly the supplier should be contacted, and a replacement scale used. Also ensure that the weight on the scale readout always return to Zero when the weight is removed.

Calibration of Scales

Definition:

Calibration is the act of checking or adjusting (by comparison with a standard) the accuracy of a measuring instrument; "the thermometer needed calibration".

Scales associated with weigh bridges are generally calibrated once a year by the manufacturer or their servicing agent and involves 'fine adjustments' to the springs on which the scale balances to ensure that when there is nothing on the scale, it read zero (0).

Some scales can be calibrated by the scale owner and will involve setting the scale's reading instrument to read exactly what a known weight is that is placed on the scale. E.g. if a 100 kg weight is placed on

the scale, the reading instrument is adjusted to also read 100kg and the scale is now calibrated against this known weight.

Always ensure that the scale is horizontally placed before use or calibration!

Example:

From: www.lmi.co.za/

LMI livestock scales consist of two load bars (2000 kg capacity) and a digital readout instrument. We also supply a full range of crates and platforms, neck and body clamps, which are bolted on top of the two load bars. Alternatively, we can the supply a sketch showing a crate that can be manufactured by the customer himself.

The length of the load bars can be chosen as 600, 800 or 1000 mm.

Maximum capacity (kg)	2000
Length of beams (mm)	600/800/1000
Height of beams (mm)	100
Weight of beams (kg)	8
Smallest reading (kg)	1 (0.1 In fine mode)

For the readout instruments we offer the following choice:

LS4 (simple readout, hand-held, fine mode, basic statistical functions)
LS2 (alphanumeric keyboard, RS232 connection, data storage and transfer to PC)

LS2P (same as above with small printer incorporated)
LS2000 (hand-held, alphanumeric keyboard, average daily gain calculation)
LS2000P (same as above, supplied together with separate printer)

All these instruments can operate from 220V AC, as well as 12 V DC. Both cables are supplied.

All the readout instruments are equipped with a stabilizing algorithm, which eliminates the spikes and oscillations in the measurements caused by very lively animals and gives a stable reading. Actually, it is possible to do the following test, which is quite impressive: let's assume that the weight of a person is 83 kg. The person jumps on to the scale and keeps jumping up and down without stopping. After about 3 seconds the display will show the exact figure (83 kg), even if the person never stopped jumping.

- The LS4 instrument shows only the weight, but it can give the following information: Number of animals weighed, total mass of all animals, average mass of all animals, maximum and minimum mass. If used in "fine mode" (up to 200 kg weight) it is accurate to 100 g. It is handheld, with rechargeable battery incorporated.
- The LS2 instrument allows you to save the animal's I.D with its mass. All the stored data can then be downloaded to a computer. The stored data can also be printed on an internal printer (optional). The data can also be printed while busy weighing. Windows software is supplied with the scale to determine daily average growth and many more reports.
- The LS2000 instrument is compact and hand-held, but quite powerful. It presents the same capabilities of the LS2, with a cell-phone type alphanumeric keyboard, and it allows to determine average daily growth while in the field

	
Platform	Load bars
	
Cattle crate	LS4
	
LS2	LS2000

Estimating Cattle Weight Without A Scale

If it is not possible to scale weigh cattle, tape measuring is a handy alternative way to estimate weight. Remember that it only gives you an approximation of the animal's weight.

How to Measure Your Beef Cattle:

- Stand the animal with head in normal position and with the four legs set squarely under the body.
- Pass the tape tightly around the body just back of the shoulders at the smallest circumference it is recommended that the animal be kept off feed and water for 12 hours before measuring. An overnight shrink is enough.

The Following Table Indicates Beef Cattle Weight

(http://www.piedmontese.org/GettingYourCattleWeightsWithoutaScale.htm):

Heart Girth cm	Weight In kg	Heart Girth cm	Weight In kg	Heart Girth cm	Weight In kg	Heart Girth cm	Weight In kg	Heart Girth cm	Weight In kg
76.2	41.314	106.68	107.144	137.16	219.736	167.64	378.636	198.12	584.752
77.47	43.13	107.95	110.776	138.43	225.184	168.91	385.9	199.39	594.74
78.74	44.946	109.22	114.862	139.7	231.086	170.18	394.526	200.66	604.728
80.01	46.762	110.49	118.948	140.97	236.988	171.45	402.244	201.93	614.262
81.28	49.032	111.76	123.034	142.24	242.89	172.72	409.962	203.2	623.796

82.55	51.302	113.03	126.666	143.51	248.792	173.99	418.134	204.47	633.784
83.82	53.572	114.3	130.752	144.78	255.148	175.26	426.306	205.74	643.772
85.09	55.842	115.57	134.838	146.05	261.05	176.53	434.478	207.01	653.76
86.36	58.112	116.84	139.378	147.32	267.406	177.8	442.65	208.28	664.202
90.17	60.382	118.11	143.918	148.59	273.762	179.07	450.822	209.55	674.19
88.9	63.106	119.38	148.458	149.86	280.572	177.8	458.994	210.82	684.632
90.17	65.83	120.65	152.998	151.13	286.928	181.61	467.62	212.09	695.074
91.44	68.554	121.92	157.538	152.4	293.738	182.88	476.246	213.36	705.97
92.71	71.278	123.19	162.532	153.67	300.094	184.15	484.872	214.63	716.412

93.98	74.002	124.46	167.526	154.94	306.904	185.42	493.498	215.9	726.854
95.25	76.726	125.73	172.066	156.21	313.714	186.69	502.578	217.17	737.296
96.52	79.904	127	177.06	157.48	320.978	187.96	511.658	218.44	748.192
97.79	83.082	128.27	182.054	158.75	327.788	189.23	520.738	219.71	759.088
99.06	86.26	129.54	187.048	160.02	334.598	190.5	529.818	220.98	770.438
100.33	89.438	130.81	192.496	161.29	341.862	191.77	538.444	222.25	781.334
101.6	93.07	132.08	197.944	162.56	349.58	193.04	547.07	223.52	792.23
102.87	96.248	133.35	203.392	163.83	356.844	194.31	556.604	224.79	803.58
104.14	99.88	134.62	208.84	165.1	364.108	195.58	566.138	226.06	815.384

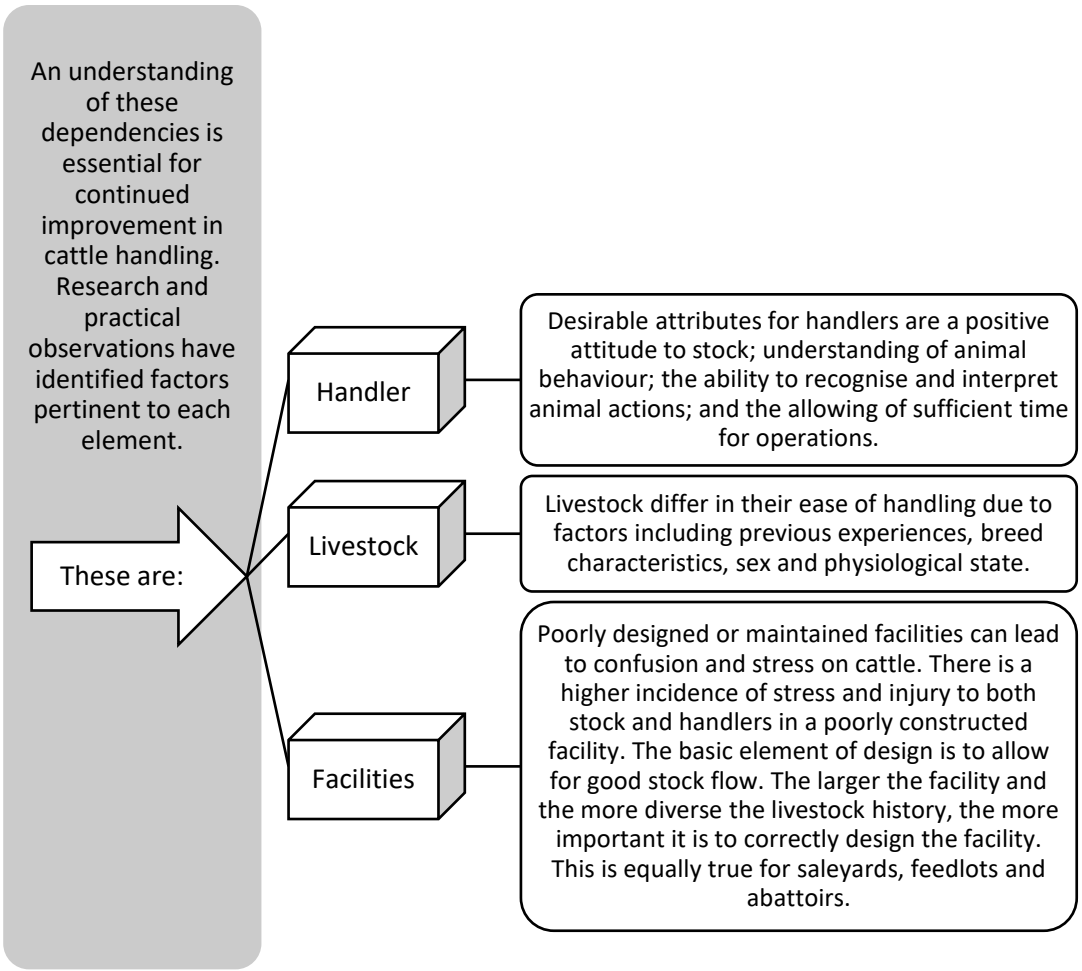
105.41	103.512	135.89	214.288	166.37	371.372	196.85	575.218	227.33	826.734

Handling Animals Humanly During Weighing

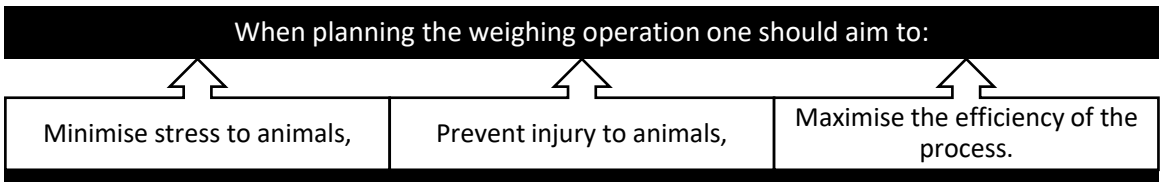
Weighing cattle can stress them, slow their weight gain and even lead to injuries. To improve animal welfare and reduce stress, there is a need for handlers to learn about livestock behaviour during handling.

The correct handling of cattle is a vital component of quality food production and good animal welfare. Handling cannot improve the basic product, but good handling will minimise product quality loss and lessen stress on animals.

The basic elements of animal handling are the handler, the stock and the facilities. These elements are all interdependent.



As indicated cattle can sometimes be naturally stressed when being forced into a crush. A thorough knowledge of behaviour patterns in cattle is necessary to enable handlers to work effectively with them. Cattle are large powerful animals and for this reason good handling facilities are crucial for effective management.



An animal that is stressed can easily injure itself and the handlers. Using experienced handlers that are familiar with the behaviour of cattle can therefore minimise the stress on the cattle and ensure a smooth weighing process.

To facilitate the accurate determination of mass, any other process or treatment that the cattle have to undergo in the crush should be done after weighing. Whilst weighing cattle it is critical that they remain absolutely motionless on the scale for a few seconds in order to ensure that an accurate reading is obtained. This means that cattle have to be as relaxed as possible when weighing and processes or treatments that might cause cattle stress must therefore be done after the scale.

Applying Human Safety Precautions

Cattle are large animals that can easily cause harm to humans. As with all other cattle handling procedures it is important that the handlers are well aware of the inherent danger and are able to adequately identify and recognise potential problem animals or situations.

Human safety precautions should be adhered to at all times and when handling of livestock, protective gear should be worn where deemed necessary. The best way to ensure the safety of humans are by ensuring that the necessary precaution is taken before hand and that the handlers use are thoroughly trained and experienced.

Shrinkage During Handling Of Cattle

Shrink results from the stress cattle experience during processing, transporting and marketing, costing both the buyer and the seller. Reducing the stress placed on the cattle during this time will help reduce losses to the value of marketed cattle caused by shrinkage.

Cattle in all age, weight and finish ranges may experience the two kinds of shrink - fill shrink and tissue shrink. Fill shrink, also known as excretory shrink, is the loss of digestive system contents, manure and urine. This type of shrink can be caused by the stress of change or the withholding of feed and water. Cattle normally lose 2% of their body weight at night, but if feed and water are withheld overnight, this increases to 6% loss in weight. This weight loss is quickly recovered in a day or two once cattle are back on feed and water. Tissue shrink is the loss of fluid from body tissues. This occurs when cattle go long periods without feed and water and are then subjected to other types of stress. Stress can be caused by events such as long-distance trucking or rough handling. Tissue shrink occurs when

cattle experience over 6% weight loss. Cattle experiencing tissue shrink may take from 10-36 days to recover their selling weight. Excessive shrink can affect finished cattle by increasing the number of dark cutters on a load or decreasing dressing percentage. It also has a detrimental effect on marbling and tenderness.

Just the act of weighing cattle causes some shrinkage. Calves can lose 3% of their weight during sorting and loading. Every 30 min spent moving cattle around in handling facilities will reduce their weight by 0.5%. Use quiet handling methods for moving and processing cattle to lessen this effect. Well-designed handling facilities will allow animals to be processed quickly while experiencing minimal stress. Do not yell or whistle at cattle. Avoid the use of electric prods, canes, whips and dogs. If not, all animals are to be sold, then sort cattle 1-2 weeks before weighing and sale. Design facilities to allow cattle to move directly onto trailers without any delays after being weighed.

Compared to cattle standing in a pen without feed and water, transported cattle will shrink 2% more over the same time period. For the first 3-4 hours during travel, cattle lose 1% of their weight per hour. Over the next 8-10 hours, they lose 0.25% per hour. Cattle lose an additional 0.61% of their weight for every 160 km (100 mi) they are shipped. On long hauls, feeder cattle shrink 25% more than finished cattle.

Over-loading and under-loading cattle on a vehicle can increase the amount of shrink. Over-loading or crowding causes stress, while under-loading causes excessive movement of the unstable cattle. Both situations can lead to injuries. Place bedding or sand in the vehicle to improve footing and reduce shrink.

Plan ahead for the marketing of cattle. Shrink can be increased by bad storms, hot weather and long delays during the trip or while waiting for unloading. Shrinkage doubles when groups of cattle are stressed by being mixed during marketing.

Weaning is one of the most stressful times in a calf's life. Weaning calves, the day before the sale and shipping them to the sales barn to stand overnight creates the most shrink in calves. Additional stressors such as sorting, loading, transporting and commingling with other groups of calves, along with the calf's decreased motivation to eat or drink, will cause additional shrink. Pre-conditioned calves will shrink less and provide a higher sale weight.

Time for cattle to regain the lost weight varies depending on which type of shrink the animals have experienced. Full shrink-recovery time may be a day or two after going back on feed and water. Cattle with tissue shrink combined with ongoing stresses such as a new feed ration, commingling or sickness could take weeks to recover their sale weight. Cattle that shrink over 9% may experience increased sickness such as bovine respiratory disease and a higher mortality rate.

There is a variation in weight loss and the rate of weight recovery within a group of cattle. Cattle from sales barns generally shrink more than cattle from direct farm sales but recover their sale weights in the same length of time.

Researchers studying how shrink in finished cattle degrades meat quality have developed nutritional supplements to reduce muscle loss and retain quality grades in cattle. These products are fed during the marketing process. These supplements are used in conjunction with low-stress handling methods to reduce shrink.

Weighing Livestock According To Procedure

Once the cattle are in the crush and the scale is set-up correctly like we discussed earlier we are ready to start weighing the individuals. There are generally two means of weighing and recording the weights. Firstly, we are going to look at the manual process.

Manual Process

- Ensure that the scale is displaying zero before the animal is allowed onto the scale.
- Once the animal is on the scale ensure that the animal is standing with all four hoofs firmly planted on the scale and that as little as possible contact is made with the sides of the crush.
- When the reading on the scale stabilises note the reading and records too next to the animal's ear tag number on a clipboard.
- Once you have taken the reading allow the animal to pass through the crush and zero the scale again before the next animal is allowed onto the scale.

Computerised Process

The computerised process follows a similar pattern to the manual process and you still have to ensure that the scale is set to zero before an animal is allowed onto the scale. Depending on the type of system in use a handheld scanner will be used to scan the animal's EDI (Electronic Data Interchange) ear tag once the animal is on the scale and the reading has stabilised.

The information will then be automatically stored on the computer's hard drive and the producer will then be able to determine weight gain or loss by easily comparing the results to the previous weigh ins. Although expensive, computerised systems have proven very effective in determining and tracking the weight of cattle accurately over long periods of time.

Restoring The Weighing Facility Back To Its Inoperative Status

Once the weighing process has been completed the facility and scale must be cleaned and stored in the correct manner. As we discussed earlier in this module it is important the scales and other equipment used during the process are clean and serviceable before the mass determination process start.

To ensure this equipment should be cleaned after use to ensure that the equipment is in the correct condition for use when needed again. Scales used for the weighing of cattle are usually robust structures that can take allot of rough and tumble, but if not used and stored correctly can easily be damaged and the cost of replacing these scales are enormous.

There is a wide variety of scales available to the farmer to use when weighing his cattle. The cleaning and maintenance procedures for these scales differ and operators that use scale should always be fully aware of the cleaning procedures applicable to the scale that they use. These procedures will include ways in which to ensure that the areas in and around the load cells are kept clean and the specific ways in which scales should be stored to minimise damage.

When cleaning any electronic equipment that was used during the process it is also important that the manufacturer's guidelines are strictly adhered to. Always be careful when using water in and around electrical equipment as circuit boards can easily be damaged and might necessitate the replacement of the entire unit.

If there are no specific instructions available always ensure that all electronic equipment or interfaces are removed from the scale before the scale's platform are washed with water and a detergent to remove mud and dust. Always check the load cells under the platform to ensure that no mud or other dirt is collect on the load cells that can impeded their function. Electronic equipment such as readouts and scanners should be wiped down using a damp and not wet cloth.

Scales and electronic equipment should be dried thoroughly before storage. Scales should be stored flat on the floor and not in an upright position to minimise the risk of damage to load cells. Electronic equipment must be stored in a cool and dry place.

Documenting The Relevant Mass Information According To Procedure

Producers can either manually capture mass information or use a computerised system to automatically record data. It does not really matter what system is used as long as the data can be presented in an easily understandable and relevant manner.

Another important factor that must always be considered when selecting or implementing a mass recordkeeping system is the need for the collection of historical data. When we look at historical data, we think about the need of the producer to be able to judge the performance of certain feedlot and other production practices against previous conditions. If the producer does not have historical data of previous mass recordings, he will not be able to judge the effect that changes in the production process have had on the productivity or profitability of the enterprise.

Manual Recordkeeping

When using a manual recordkeeping system, it is critical that the correct information is collected and recorded. If for instance a mistake is made, and the wrong mass are linked to the wrong ear tag number a producer may implement processes and treatments that are inappropriate and the results can cause severe financial loses to the enterprise.

Manual recordkeeping systems, by their nature, are also more likely to be influenced by human error. It is therefore important that the persons responsible for the collection of the information and the maintenance of the recordkeeping system are well trained and highly motivated.

In most instances a producer will make use of a combination of manual and computerised recordkeeping, with the mass results being captured on a computerised system after it was manually obtained in the field during the weighing process.

This process unfortunately allows for another area where the human factor can have a bug influence. If the data capture is tired or not concentrating mistakes can easily be made and the wrong mass entered against the wrong numbers. It is therefore important that a cross check system during which data is verified by another member of the staff is introduced and implemented to ensure that the data is captured accurately and that mistakes are minimised.

Computerised Recordkeeping

In the previous section we discussed the manual recordkeeping process and highlighted the problem associated with this system. It is due to this human factor that the use of fully computerised systems is gaining in popularity.

Most systems available to the farmer today will comprise of a full livestock management system whereby cattle are tagged using EDI tags. These tags identify all the individuals in the herd separately and a wide range of information concerning treatments etcetera can then easily be stored and captured. This allows a farmer to identify all the processes and treatments that a certain individual has undergone easily and effectively and thereby increases the productivity and decision-making capabilities of the producer.

Although a fully computerised recordkeeping system removes allot of the risk of human errors creeping in, the system is still only as good as the operator. It is critical that operators are well trained and motivated, and that a cross check system is put in place whereby all entries can be double checked and verified.

Another important factor when working with any computerised system is that information on the system must be backed up regularly. Backing up information should be a set procedure with back-ups done weekly on a separate hard drive stored in a different part of the facility.

Counting The Livestock Weighed

A simple system used to ensure and maintain the accuracy of the mass data collecting procedure is the counting of livestock. The livestock to be weighed should be counted as they enter the crush and the number of results should then be checked against this count.

This is done to ensure that every individual is weighed and that all the necessary data are obtained. It happens often that in the confusion of the process a head of livestock might slip through. To lessen the risk of this happening it is advisable that small batches of livestock be weighed at a time. This practice also decreases the anxiety of the animals and ensures a more accurate procedure.

If it happens that the number of stock weighed don't correspond with the initial head count of the livestock in the pen, the entire batch of animals must be rerouted and reweighed. Ensure that all data captured prior to this are removed and recaptured as per the procedure.

Reporting The Relevant Information According To Procedure

Once all the information has been recorded, captured and cross checked it must be passed into the relevant role players. On most farms this information will be passed on to the producer or the farm manager.

Always ensure that information that is passed on is relevant and concise. Information should be captured and relayed in such a manner that the information can be used with the minimum of input

from the farm manager or producer. On most farms graphs will be used to track the development and growth of individuals and groups of cattle on the farm.

If the information is not passed on to the correct person timeously, decisions critical to the effectiveness and profitability of the enterprise might be delayed or not made at all. It is therefore important that any enterprise design and implement procedures whereby information that has been collected are passed on regularly to support and facilitate the decision-making process on the farm.

POE Activity 4

POE Activity 5

Learning Unit 5

Feedlot Practices

Feedlot Management

Feed = food for domestic livestock

Feeding schedule = A simple schedule that tells you what to feed the herd and when, and how to mix and prepare those foods in order to feed it to the animals.

Feed bunk management refers to all aspects of the feed selection, delivery, consumption, and control of the feeding program. Researchers refer to feed bunk management as the quantity of feed offered to the quantity of feed consumed. The goal is to assure fresh, palatable, and balanced rations which are available to reach optimum (not maximum) dry matter intake. As herd production increase, you need to monitor dry food intake carefully. It is the most important factor in ensuring sufficient animal bulk and in maintaining milk production in dairy herds.

Feed bunk management does not involve feed delivery decisions alone. It also involves ration ingredient characteristics and quality control, nutrient balancing, feed processing and mixing, water quality control and other factors related to feed presentation.

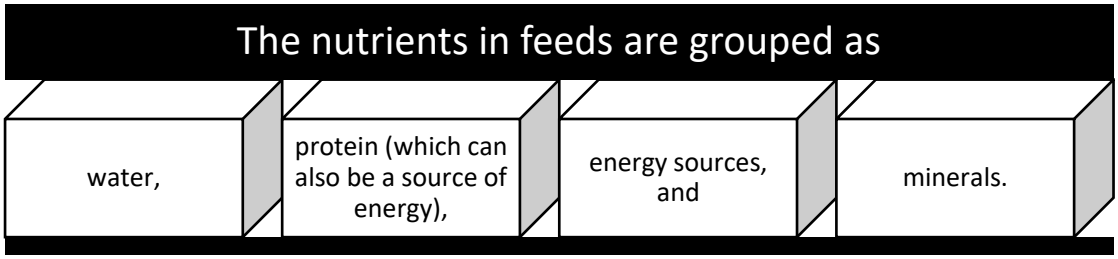
Superior livestock performance begins with quality feedstuffs and a sound nutritional program. All livestock producers should establish quality standards and acceptance/rejection criteria for all feed ingredients to account for and control variation in feed composition and quality. Systematic sampling, accurate analysis, and timely ration adjustments, based on nutrient density and moisture content of individual feedstuffs, are all fundamental to ration quality control.

Rations should be fresh, palatable, and uniformly nutritious. Spoiled or mouldy feed ingredients should be discarded; this helps minimise ration contamination and potential for reduced intake. Unfortunately, discarding of spoiled feedstuffs is not always a common practice. In a recent study, growing steers were fed high-silage rations, which contained 90.0% well-preserved corn silage or 67.5% well preserved corn silage and 22.5% spoiled corn silage (e.g., silage from the original top 3 feet in an unsealed bunker silo). Steers receiving the ration with the spoiled silage had significantly lower feed intake and lower organic matter, protein, and fibre digestibility.

Delivering the wrong ration can lead to disaster. But mistakes can and do happen. In a feedlot, an alert feed truck driver knows that, when he loads the tractor with grain, it's not supposed to go to a pen of bawling calves or yearlings with sale barn tags still on them.

Proper feed processing and mixing are essential for optimum feed utilisation. Adequate and consistent feed mixing will ensure that every bite of the ration is the same. Fine particles that separate in the bunk must be avoided, because they can contain high concentrations of minerals, feed additives, or rapidly fermentable grain particles. Ration conditioners (e.g., molasses, fat, or water); high moisture feedstuffs; and uniformity of forage particle size can help reduce fines, sorting of ingredients, and rejection of feed.

Basic Feedlot Feeding Ingredients And Their Functions



This division is based on relatively simple laboratory techniques although modern technology makes it possible to determine the chemical composition in greater detail, this division satisfies most requirements for feeding farm animals.

Water

Water is the most important nutrient. Without water animals die very quickly. Water shortages often result in reduced feed intakes, leading to poor animal performance. There is evidence that the provision of clean water in adequate quantities leads to improved animal growth. This is understandable because water is the fluid carrier of chemicals in the animal body.

The water content of feeds varies from as much as 85% in some pastures to 10% to 15% in conserved, dried feeds. The water content of feed is determined by weighing a representative sample of the feed, drying it in an oven to constant weight, and assuming that the difference in weight loss before and after drying is the moisture content of the feed. When comparing different feeds, the comparison is simplified when composition is expressed on a dry matter basis.

Protein

Protein can serve as a source of energy, but the main functions of protein are as building blocks of the body, especially muscle. Proteins are made up of amino acids, some of which are considered essential *i.e.* must be provided in a healthy diet, because certain animals do not have the ability to synthesise the relevant amino acids. Because the rumen of ruminants contains many micro-organisms which can produce essential amino acids, ruminants are not as dependant as mono-gastric animals on their diets for the provision of essential amino acids.

As a rule, ruminants should ingest diets containing at least 10% to 15% crude protein. The crude protein content of feeds is determined by measuring the nitrogen content of the feed, assuming that all the nitrogen is contained in proteins, and multiplying the value by 6.25. This is based on the fact that proteins contain 16% nitrogen. For beef cattle, compiling rations using crude protein content as the measure of protein in the diet, provides satisfactory results in most cases.

Excess protein in a diet is not desirable. A crude protein content in a diet of 25% to 30% can be tolerated by cattle adapted to such diets, but higher levels of crude protein should be avoided.

Energy

Energy comprises the bulk of most diets because energy provides the driving force to do work. The main sources of energy are starches and fats. With ruminant's crude fibre, which comprises structural carbohydrates in plants, is utilised as an energy source. Although fat is a good source of energy, it usually does not comprise a significant proportion of energy in beef cattle diets. Should fat be included in rations for cattle, the fat should not exceed 5% of the total diet?

With cattle, when a diet contains less than 20% roughage, digestive disturbances are likely, although modern feed additives make it possible to feed rations to cattle containing as little as 15% roughage. The inclusion in a diet of excess amounts of carbohydrate (especially readily fermentable carbohydrate) *e.g.* maize meal, can cause acidosis. When carbohydrates are broken down in the rumen, acids are formed and when present in large amounts, the pH of the rumen drops to levels at which the rumen microflora cannot function effectively.

The energy content of feeds can only be determined by more complicated laboratory procedures, including measuring the digestibility of the feed when fed to animals. The energy content of feeds is therefore usually not measured routinely. Previously the energy content of feeds was expressed as total digestible nutrients (TDN), but the present measure of energy content is metabolisable energy (ME), which is measured in mega-joules (MJ).

The digestibility of a feed is the proportion of feed not excreted in faeces and is assumed to have been absorbed into the animal's body.

Minerals

Minerals are divided into major- (required in larger amounts) and trace minerals (needed in only small amounts). Calcium, potassium, magnesium, sulphur, phosphorus and chlorine are the essential major minerals, and iron, manganese, copper, cobalt, iodine, zinc, molybdenum and selenium the essential trace minerals. Fluorine, bromine, barium and strontium could be essential. Chromium, nickel, tin, aluminium, vanadium, boron, lead and titanium are usually present in feeds, but are considered non-essential.

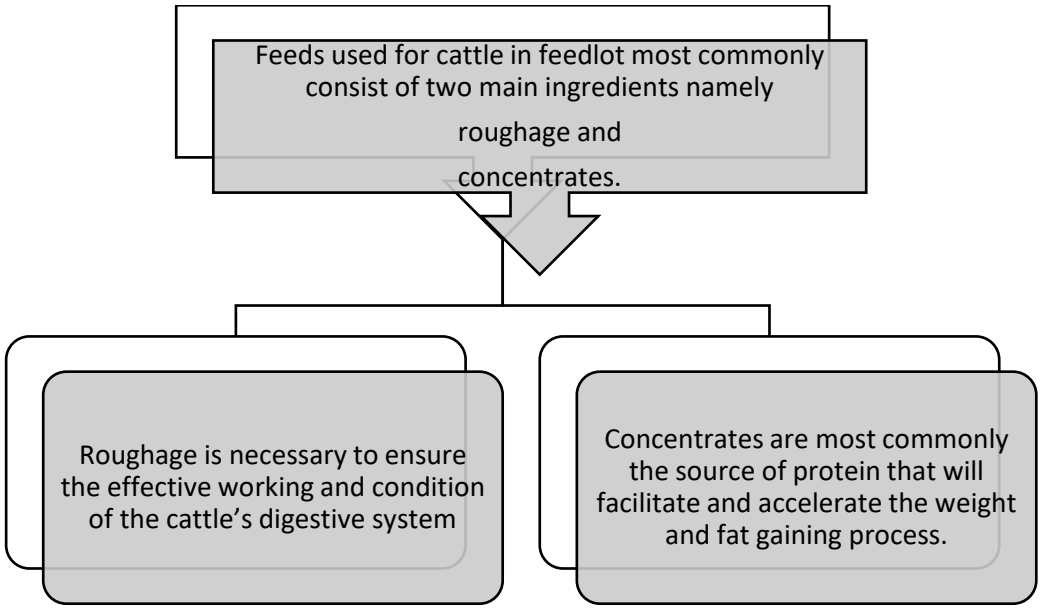
Mineral requirements and maximum tolerable levels of minerals for beef cattle.

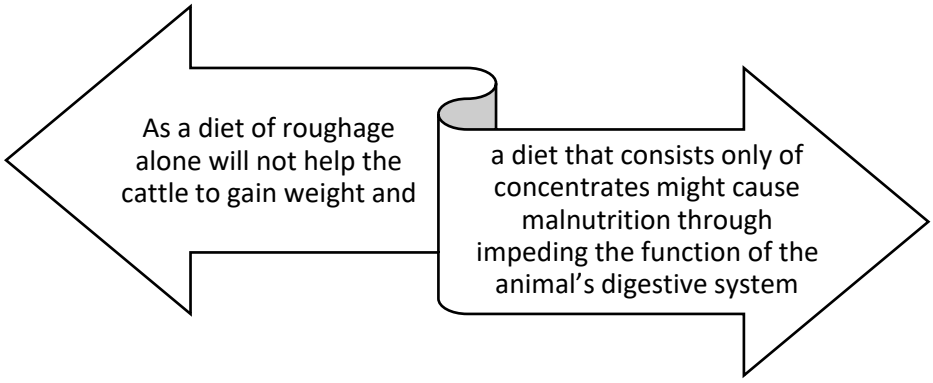
	Mean	**Range**	**Maximum tolerable level**
Calcium %	Table 3 & 4	0.18 to 0.53	2
Magnesium %	0.10	0.05 to 0.25	0.40
Phosphorus %	Table 3 & 4	0.18 to 0.37	1
Potassium %	0.65	0.5 to 0.7	3
Sodium %	0.08	0.06 to 0.10	10
Sulphur %	0.10	0.08 to 0.15	0.4
Cobalt mg/kg	0.10	0.07 to 0.11	5
Copper mg/kg	8	4 to 10	115
Iodine mg/kg	0.5	0.20 to 2.0	50
Iron mg/kg	50	50 to 100	1000
Manganese mg/kg	40	20 to 40	1000
Selenium mg/kg	0.1	0.05 to 0.30	2
Zinc mg/kg	30	20 to 40	500

Vitamins

With monogastric animals, many vitamins are essential and must be provided in the diet. With ruminants, vitamin deficiencies are rare. The only vitamin that plays a significant role in cattle feeding is Vitamin A. Green grazing contains large amounts of Vitamin A precursors so that only when cattle

have not had access to green feed for 2 to 3 months or more, the supplementation of Vitamin A would be necessary.





It is therefore important that the feedlot operator must be able to determine the correct blend of roughage and concentrates to ensure maximum weight gain.

Many factors have an influence on the nutritional value of roughages like hay and silage, for instance the stage at which crops are harvested, loss of leaves and storage methods as with concentrates.

Another point to consider is the cost of ingredients for mixing but also convenience, credit, service, and overall ability of a feed supplier to meet your needs. A considerable spread in price per ton may exist for the same feed. Sourcing locally available products such as brewer's yeast can cheapen a diet when feeding a total mixed diet.

Table 1.1 - The following roughages are available:

Hay from legume plants	Lucerne is the best-known legume hay. It is very palatable and is usually beneficial in nearly all rations. It contains high protein levels in general but is relatively poor in energy. It combines well with feed like maize silage, maize and molasses. There is no restriction on the levels of inclusion. As a result of its high calcium content it should however be avoided during the dry period in cows that are prone to milk fever. Pea hay is mostly of a poorer quality than Lucerne hay especially because most of the seeds had been removed. The same principles apply regarding the feeding of it. If hay from peas is stringy, it should preferably be ground to increase intakes.
Grain and grass hays	These hays have lower protein and calcium levels than legume hays. The growing stage, during which crops are cut for hay, has a large influence on the spontaneous intake and nutritional value of it. In lactating cows, the levels of inclusion are usually limited because of its lower quality.
Pasturages	Grazing is normally the cheapest source of roughage for cattle. Factors that limit weight gain from grazing are mainly the energy content and the high moisture content of crops. The protein content of rye grass clover grazing is usually high. Kikuyu has low levels of calcium. Other pasturages on the other hand have high levels of potassium and should be avoided.
Straw	This comprises the stalks and leaves of crops that remain once the seed had been threshed out. Grain straws are the best-known low-grade roughages. It is low in protein, energy and minerals. Of the most common small grains, oat straw is probably the most valuable, followed by barley and corn straw. Maize straw and grain sorghum straw are just as good as oat hay or even better. Straws should be ground in order to get good intakes. The low nutritional value of straws limits its inclusion levels. Small grain straws should preferably not be used in rations. With the

	necessary supplementation straws can be used to a limited extent in the feeding of replacement heifers. In the Western and the Southern Cape small grain straws are often upgraded by treating it in an oven or in a stack with ammonia. That way the energy and protein content, as well as the palatability are improved considerably. It is not normally necessary to grind ammoniated straw. In the case of feedlot cattle, it should not make out more than 40% of the ration. When ammoniated straw is used, it is important for the levels of phosphorus, magnesium, zinc, cobalt, selenium and copper, as well as vitamin A and E to be supplemented.
Silage crops	This is the cheapest method of storing roughages. Maize is mainly used for this. Good quality silage can also be made from most grass types and legume plants. Silage has high moisture levels and as a result it is bulky. The crude protein level in silage is often higher than that of hays. It is excellent feeding for young animals older than 9 months. There is no limit on its inclusion in rations. Mouldy silage often contains fungi with dangerous toxins, and it should therefore not be fed to animals.

Table 1.2 - The following concentrates are available:

Barley	On its own or together with another small grain barley it can replace up to 70% maize, provided it is of a good quality.
Blood meal	This is a good source of protein. Palatability can be a problem, especially when it is given together with meat meal (tankage).
Bone meal	This comprises bones that have been cooked, dried and ground and it is primarily given as a source of calcium and phosphorus. It is also a good source of trace elements.
Brewer's grains (barley)	This is the residue after the brewing of Lager beer and is a mixture of barley, maize and brewer's yeast. The product is very tasty, and it is also safe to use it.
Chicken manure	Two types are available - manure obtained from laying hens and from broilers. As a rule, the manure obtained from laying hens

	does not contain bedding and it has a higher protein content than manure obtained from broilers, which contains bedding, like sawdust and paper. Chicken manure is most suitable when used in rations of growing animals older than 6 - 9 months of age. Vaccinate all animals against botulism before using manure.
Grain sorghum	It is recommended that grain sorghum should be crushed in a roller mill because it is crushed too fine in a hammer-mill. The dustiness will make it less palatable. In theory it can replace maize.
Fish meal	This is a good source of protein. Palatability could be a problem when animals are not used to it.
Groundnuts	In cases where the levels of inclusion are too high, diarrhoea and a decrease in the butter fat percentage and protein are found.
Groundnut oil cake meal	It is high in protein and palatable, but there is a large risk of aflatoxin.
Lupine seed	It is relatively rich in protein and high in energy.
Maize	Yellow as well as white maize is suitable as fodder, with the best results when it is coarsely ground or rolled. The high starch content limits the daily portioning.
Meat meal (tankage)	Meat meal has a high percentage of protein, but palatability could be a problem, especially when it is used together with blood meal.
Oats	It has high fibre content but is very palatable and can replace maize in young animals.
Soybeans	It is high in protein and energy as a result of a high fat content. It is not recommended for inclusion in rations for calves and dairy cows and which also contain urea.
Sunflower seed	As a result of the high oil content the seed has a high energy potential, but protein is relatively low. It could lower the butterfat and protein in milk and could also cause diarrhoea in cases of high inclusion levels.
Triticale	The energy and the protein levels are about the same as in wheat.

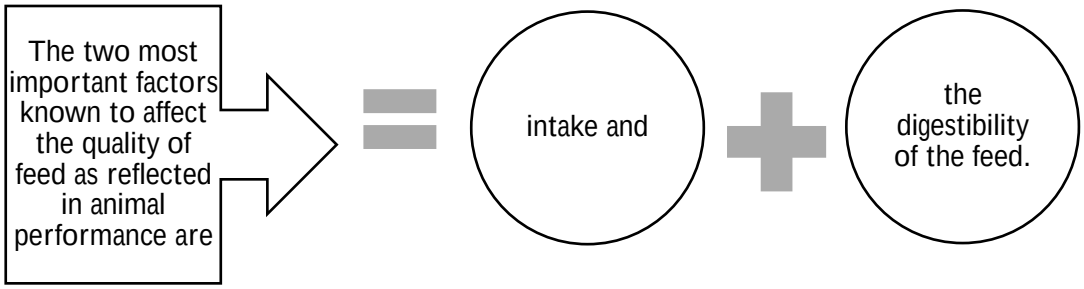
Urea	Urea is not actually a source of protein, as it is in fact a concentrated form of nitrogen. Microbes in the rumen can use it to build up microbe-protein. Urea is very quickly catabolised into ammonia in the rumen and too much urea could cause so much ammonia to come into the bloodstream that the animal could die from it. The use of urea in rationing for animals on tame pasture is not usually recommended.
Wheat	The energy value of wheat is slightly less than that of maize. In cases of high intake acidosis occurs sooner than is the case with maize.
Wheat bran	It is relatively low in energy with about 14 per cent protein and it is also high in phosphate.

Feedlot Diets

Most feedlots will employ a nutritionist to help them to formulate their main feed blends. The availability of ingredients will always be a factor when a new feed blend is formulated and therefore there are usually significant differences in the exact feed blend formulas form one feedlot to the next.

Cattle in feedlots also have different nutritional needs and, depending on their state and age, will be fed different feed blends. Most commonly a good feed blend will consist of roughage and protein as we discussed in the previous section. Quite often though, the nutritionist within the feedlot might identify the need to add supplements such as vitamins and minerals to the feed blend in order to facilitate the weight gaining process.

Various terms are used to describe the nutritive value of feeds, including feeding value and quality feed. Often these terms are used without a clear definition of what is meant. Ultimately, the best criterion of feed quality is the performance of the animal consuming the feed.



In feedlots, concentrates formulated to achieve the most economic animal performance, are used. With concentrate feeding *i.e.* where feeds with a digestibility above 70% are fed, intake is limited by

rumen capacity and the digestibility of the feed is the major determinant of animal performance. For feeds where the digestibility is below 70%, it has been shown that voluntary intake by the animal is the major factor limiting animal performance. A trial at Glen showed that approximately 80% of the difference in quality between roughages could be ascribed to voluntary intake and 20% to digestibility. With very poor-quality roughages, cattle cannot ingest enough feed for maintenance requirements. In the case of beef cattle, the main source of nutrients is the grass they graze. Farmers are therefore well-advised to evaluate quality of grazing with care and ensure that cattle not only have enough feed, but that they grow well, indicating that the quality of their feed is good. Experience has shown that when grass is grazed at a relatively early stage of growth *i.e.* has not matured to the extent that its lignin content is still relatively low, animals perform well.

Different animals require different types of food and amounts of nutrients to satisfy their nutritional needs.

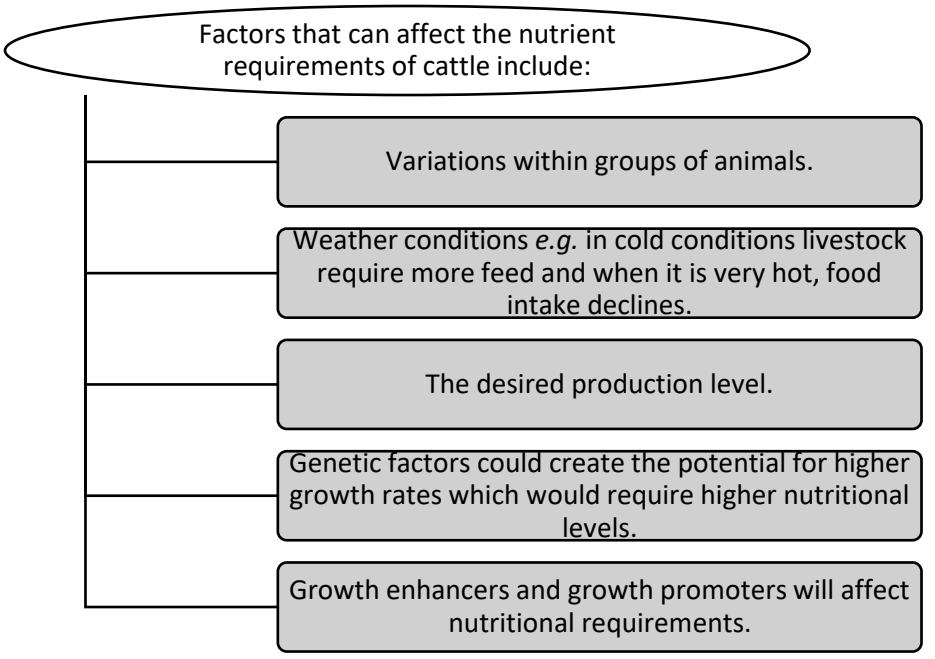
It is important that you have an understanding of potency of the various ingredients that can be used to formulate feedlot feeds. Commonly when we refer to potency, we refer to the protein content of the different ingredients. There are however a range of factors that can have an influence on the protein content of the concentrates or roughages used in your feedlot blend, so it is important to have the various components tested on a regular basis in order to accurately measure the potency.

The following table contains various concentrates with their relative energy values compared to corn and suggested levels of use in feedlot diets:

Value of various energy sources compared to corn in feeder rations with ration restrictions.

Concentrate	**Value Compared Ration to Corn**	**Restriction**
	(%)	(maximum %)
Corn	100	100
Animal fat	160-180	5
Barley	88-90	100

Beet pulp, dried	88-95	50
Millet	90-100	50
Milo	85-95	100
Molasses	70	5
Oats	88-94	25
Rye	80-85	20
Wheat	100-105	40
Wheat bran	65-80	10
Wheat middling's	70-85	20



With the nutrition tables, tables reflecting the chemical composition of feeds are available and, where the analysis of a feed is not available, these tables provide usable data.

Supplements

Where cattle are on veldt grazing, it is common practice to provide them with supplements. The objective is to add to deficiencies that may exist in the feed available to them and thus prevent losses. It can happen that severe deficiencies exist on a specific farm and farmers should always monitor their livestock to determine the presence of specific problems on their farms. On the other hand, supplements can be used to enhance animal performance. Enhanced animal performance is only advisable when gains provide greater financial returns than the associated input costs.

Summer Supplements

In many parts of KwaZulu-Natal, shortages of iodine, zinc and magnesium limit the growth of livestock. In addition, on almost all farms in the region, phosphorus and salt should be provided, although in many areas close to the sea, salt inhibits lick intake when added to the licks in even small amounts.

A mature cow requires about 30 g of salt and 10 g of phosphorus per day.

Many commercial summer licks are available, but the most commonly used is to mix dicalcium phosphate or P12 with salt. The salt usually comprises 50% of the lick but must be reduced where lick intakes are too low. Intakes of 170 g per cow per day can be expected.

Winter Supplements

With winter feeding of beef animals, the objective is to maintain adequate body condition for cows so that they can calve down during the subsequent summer and re-conceive as well. The main deficiency in winter veldt, more specifically in the sourveld, is a protein deficiency. The general recommendation is to provide 200g of crude protein per adult dry cow per day. This could be achieved by the provision of winter licks or the feeding of oil cakes. Many licks are available, and advisors should be consulted. Whichever lick is used, it must be remembered that enough roughage must be fed with the lick because licks are additives and the bulk of an animal's diet must be provided by relatively cheaper feed. Some examples follow:

Example:

Winter lick 1:

Feed 2 kg poultry litter per cow per day.

Caution: Livestock being fed poultry litter must be vaccinated for botulism and the litter must be free maduramycin.

Winter lick 2, for sourveld:

Maize meal 20.2%

Salt 46.2%

Feed lime 16.8%

Urea 16.8%

Intake should be 0.4 kg per cow per day.

Caution: This lick contains a non-protein nitrogen (urea) and the necessary precautions must be tak including that livestock must be adapted to the lick and the lick must be kept dry. This lick does not cont phosphorus and is suitable for mature animals, whereas growing animals should still be fed phosphorus

Winter lick 3, for sweetveld:

Maize meal 35.8%

Salt 30.0%

Feed lime 17.1%

Urea 17.1%

Intake should be 0.385 kg per cow per day.

Caution: This lick contains a non-protein nitrogen (urea) and the necessary precautions must be taken, including that livestock must be adapted to the lick and the lick must be kept dry. This lick does not contain phosphorus and is suitable for mature animals, whereas growing animals should still be fed phosphorus.

Definitions:

Feeding stuffs

In general, this term is synonymous with feed, food or fodder, but it is a broader term in that it includes all materials included in the diet for their nutritional properties. It includes plant or animal products and by-products as well as chemically synthesised pure nutrients or mixtures of nutrients added to animal feeds. Thus, maize meal is a stock or human food, but the vitamin thiamine-HCl is a pure nutrient that can be chemically synthesised. The vitamin is not food but is a foodstuff.

Ration diet

A ration is a 24-hour allowance of a feed or of a mixture of feedstuffs. The term implies nothing with respect to the suitability or adequacy of the allowance but merely refers to the amount of the provisions permitted. We commonly refer to the daily allowances for animals as rations but speak of human diets. For all practical purposes these terms are synonymous.

Balanced ration

This refers to a feed mixture just sufficient to provide for all the requirements of a specified animal for one day. The term "balanced" originally referred to the proportions of fat, carbohydrate and protein in the ration. In the feed trade a balanced ration refers to a mixture of feedstuffs nutritionally adequate for the feeding of specified animals when used as recommended by the manufacturer.

Nutrient

A nutrient is any food constituent or chemical substance that aids in the support of animal life. Thus, carbohydrates, fats, proteins, individual amino acids and the various vitamins and minerals are all nutrients.

Toxicity

This term should be distinguished from "poisonous". A nutrient may be essential to an animal in small amounts, but when taken in excess it may result in toxicity, mild or acute. Fluorine is desirable in small amounts (about 1 mg/kg in the DM of the ration), but it is harmful in large amounts (about 30mg/kg) and it may actually poison the animal.

Feeding standard

A general term for tabulations of the amounts of the various nutrients required by specified animals.

Feed allowance

The amount of feed actually given to an animal daily. It is usually greater than the "requirements" by a safety margin to allow for variations in requirements between individuals.

Nutrient requirement

A statement of what an animal on average requires for a particular function.

Digestibility

This term is usually taken to mean that nutrients which are consumed are broken down in the digestive tract and absorbed. In common language both processes, digestive attack as well as uptake of the resulting nutrients, are understood by the term "digestion".

Composition and concentration

Composition may be expressed as a percentage (%) or as mass/unit mass *e.g.* g/kg.

Concentration may be percentage or mass/unit volume *e.g.* ml/litre.

Very low concentrations are usually expressed as mg/kg (ppm - parts per million)

Vitamin units are usually expressed in terms of mass of active compound and called i.u.

Antioxidants

Natural fats possess a certain degree of resistance to oxidation, owing to the presence of compounds termed antioxidants. These prevent the oxidation of unsaturated fats until they themselves have been transformed into inert products.

Metabolic body size

This is the mass of an animal (kg) raised to the power 0.75 ($Wkg^{0.75}$)

Energy

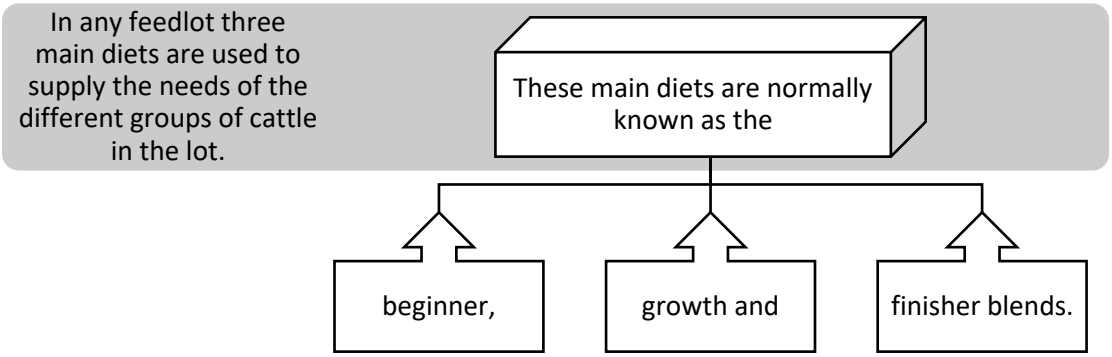
The international unit of work and energy is the joule. One joule is the work done by a force of 1 Newton exerted through a distance of 1m. One Newton is the force that will give a mass of 1kg an acceleration of $1m/sec^2$.

1kcal = 4.184 kJ or 1 kJ = 0.239 kcal

Previously energy content of feeds was expressed as TDN (total digestible nutrients), whereas ME (metabolisable energy) is the modern unit used.

To convert TDN to MJ of ME, multiply the TDN value with 0.15%.

Understanding Feedlot Blends



Starter Blends

Newly arrived calves do not readily eat upon arrival in the feedlot. On day one in the feedlot, only 22% of the calves may eat. By day three, approximately 40% may still not be eating. And on day 10, an average of 15% of the cattle may not be eating. Starter rations should be fed for 3-4 weeks after arrival. The actual starter ration should contain from 60% to 80% concentrates. If cattle are destined for a high roughage program, the starter ration should be about 40-50% concentrates.

The starter ration should contain about 16% crude protein on a dry matter basis, depending on intake. Dry matter (DM) intake is often less than 1% of body weight during the first week of arrival. Diet concentrations of protein and other nutrients need to be increased based on feed intake level in order to meet requirements. Recent research has suggested that up to 23% crude protein (dry matter basis) during the first week, comprised partially of a by-pass protein, can improve gains during the first week.

Animal sources of by-pass protein may be less palatable which means that a flavour enhancer such as molasses may need to be added. One thing to keep in mind when feeding receiving diets containing 70-80% concentrates, and high levels of crude protein is that these diets are highly digestible. Therefore, stools will be much looser than if the calves were being fed a diet with a high roughage content that was less digestible. The loose stools clear up in approximately two weeks and should not be confused with a diarrhoea condition resulting in dehydration.

Calves are not initially capable of utilizing urea or other non-protein nitrogen sources very effectively. In addition, as urea decomposes in the bunk, as sometimes occurs in hot weather, it gives off an

ammonia odour. Possibly, urea can be added up to 0.5% of diet dry matter in receiving diets, but higher levels may depress feed intake.

Provide about 3000-4000 International Units (IU) of vitamin A per kilogramme of dry matter. Receiving diets containing between 50 and 100 IU of vitamin E per pound may be adequate for most circumstances. Supplementing vitamin E through the diet appears to be more beneficial than by injection intramuscularly during processing of cattle.

The B complex vitamins are generally produced in sufficient quantities in the rumen and use of B vitamins has not consistently improved performance. However, if cattle have been off feed for some time, supplemental B vitamins, particularly niacin and thiamine may be beneficial. It has also been observed that calves fed supplemental B vitamins (600 mg niacin, 200 mg thiamine and 750 mg choline per head) plus vitamin E gained more weight than calves fed vitamin E alone.

The following table contains the nutrient recommendations for starter blends

Nutrient Recommendations for Starter Blends			
Dry Matter, %	80-85	Sodium, %	0.2-0.3
NEm, mcal/lb	0.70-0.75	Sulphur, %	0.08-0.15
NEg, mcal/lb	0.45-0.55	Copper, ppm	10-20
Calcium, %	0.6-0.8	Iron, ppm	50-100
Phosphorus, %	0.3-0.5	Manganese, ppm	100-200
Potassium, %	1.0-1.4	Zinc, ppm	20-40
Magnesium, %	0.2-0.3	Cobalt, ppm	75-100
Crude Protein,%	16	Selenium, ppm	0.1-0.2
Vitamin A, IU/lb	2000-3000	Vitamin E, IU/day	0.3

Some benefits may be realized by phase feeding diets which provide 20-23% crude protein during week 1, 17% crude proteins during week 2 and 14% crude protein in week 3. Protein concentration decreases as intake increases to provide the same amount of protein daily.

There are also a range of artificial supplements and medications that can form part of the starter blends to help calves increase their DM intake. A nutritionist should be approached to determine the supplements needed to obtain maximum weight gain in new calves.

Growth Blends

In most feedlots there is very little if any distinction between growth and starter blends. The only real distinctions are adjustments in medication and supplements with cattle being allowed to eat as much as possible.

Some producers might also adjust the level of protein in the diets to slow down the rate of weight gain in cattle. Growth feeding normally means the cattle consume feed ad libitum (all they want). Some attempt to moderate daily intake fluctuations can be done with bunk management. Cattle can be put on forage, hay-based, silage-based or moderate gain level diets to grow at moderate rates of gain. These systems are well suited to many producers who are limited by facilities or by having abundant supplies of forages to use.

Finisher Blends

After the cattle have grown to about 340 kg, they are placed on high grain, finishing diets. These programs are best suited to medium frame cattle. This will allow them to finish at a heavier weight. Large frame cattle are better suited to high grain finishing diets following weaning. Although large frame cattle can perform very well on forage-based diets, caution should have considered since they will also finish at greater than desirable weights. Type of cattle, price margins, market conditions and feed supplies will dictate the optimum system for each producer.

Limit feeding strategies can also be applied during the finishing period and have two potential applications for cattle feeders. Backgrounders can limit intake of a high grain diet to achieve any rate of gain desired. This strategy should be considered when corn is a less expensive source of energy than hay. Limit feeding can also be used for finishing cattle to improve feed efficiency and increase carcass leanness.

Recent research suggests that feed efficiency may be improved if cattle are fed at intakes which are slightly less than ad libitum. In these trials' cattle were fed 10-20 percent less feed than counterpart steers allowed to eat free choice.

Cattle were all fed to the same final weight (520 kilograms). Each 10% decrease in intake decreased rate of gain by about 1kg per day. As a result, it took the limit fed cattle 15-25 day longer to get to market weight. However, the limit fed cattle used 50-120 kilograms less feed to achieve market weight even though they were on feed longer.

There were also advantages to limit feeding in terms of carcass composition. Limit fed cattle had carcasses with 15-25% less fat than the full fed cattle. This was achieved without decreasing marbling score or quality grade.

The system described above would provide little economic benefit for cattle feeders in today's marketplace. The improvement in feed savings would probably be offset by the need to feed cattle longer. This should change if a value-based marketing system were in place which rewarded carcass lean. The bottom line is that it may not always be best to allow cattle to set their own intake. By manipulating intake, producers may be able to improve feed efficiency, cut costs and produce a more desirable carcass.

Producers wanting to implement a limit-feeding program should make sure all the cattle can eat at the feed bunk at one time. Otherwise, dominant cattle will consume more feed than needed and probably incur acidosis conditions.

Finishing rations should have roughage levels of 10 to 15% on a dry matter basis so as to prevent potential problems if there is any processing. Ideally, it is desirable for the corn and the roughage to be mixed together to avoid sorting and digestive upsets. A course chop (greater than 6mm) is suggested for hay or silage. Bunk management is critical to reduce fluctuating intake and acidosis problems. Roughage is included in finishing rations to firstly contribute to the physical nature of the rations and, secondly, to provide nutrients.

Identifying Concentrations Of Ingredients In Blends

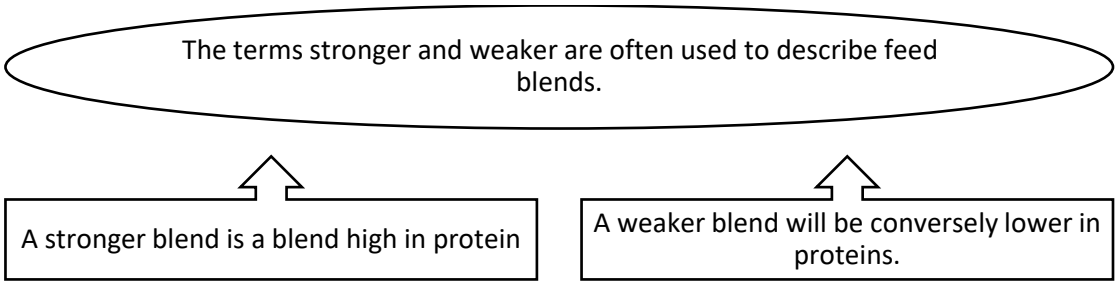
As we discussed earlier in this guide any feed blend consists of a range different ingredient. These ratios and type of ingredients differs also from blend to blend and are specifically designed for cattle at a certain stage of growth. As do the vitamin and mineral supplements differ between feed blends.

It is therefore important that a feedlot operator or manager is able to distinguish between the different ingredients and the concentrations of those ingredients in the feed blends to ensure that cattle receive the correct feed. No feedlot manager or operator should ever use a feed blend bought from a supplier and not mixed on the feedlot without obtaining sufficient information concerning the content of the and the concentration of the different ingredient of the blend.

Only ever use reputable suppliers for blended feed and if you are unsure about the supplier it is good practice to rather mix your own feed in the feedlot in order to obtain the correct blend of ingredients

and the correct concentrations of those ingredients to ensure maximum growth of cattle. If a feedlot manager are uncertain about the contents of feed blends some universities and a few independent laboratories offer the necessary testing services that can be used to test and determine the content of blends.

Understanding When a Feed Blend is "Stronger" or "Weaker"



Calves are normally started off on weaker feed blends until their capacity to digest proteins increase. The blend is then strengthened by adding more protein to the blend to assist and accelerate weight gain. As the cattle move towards finishing the protein content of the blend might be adjusted again to slow weight gain as we discussed earlier.

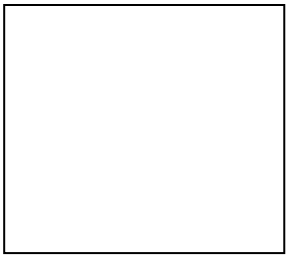
Pearson Square

Farmers are advised to make use of an experienced nutritionist to formulate rations for their own mixing programmes. Should a farmer want to mix two or even three ingredients, making use of the Pearson square method or by iteration, a reasonably effective ration can be formulated. Usually standard tables reflecting the composition of the different ingredients are used, although the chemical analysis of the same type of feed can differ significantly from batch to batch.

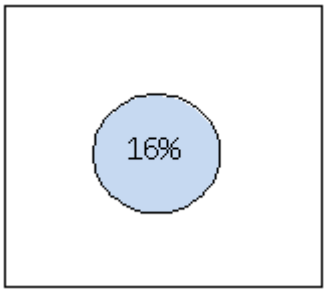
The Pearson Square is a calculating device for determining the ratio between two different feeds in order to reach a specific target protein level in your final mix.

Method:

Step 1: Draw a square

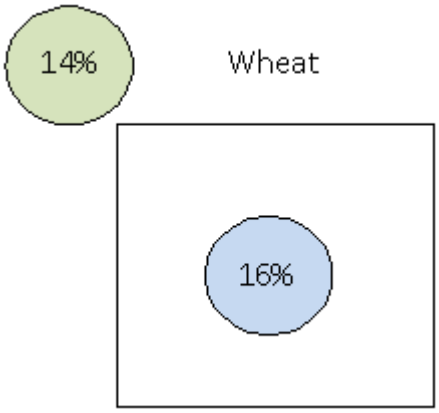


Step 2: Choose a target protein percentage and place the percentage in the centre of the square

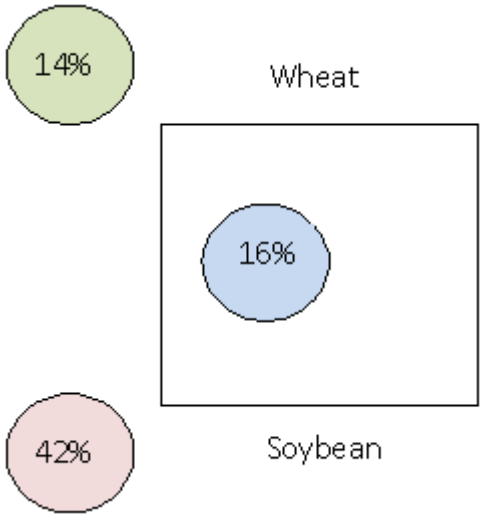


This is based on the dietary needs of the animal you are feeding

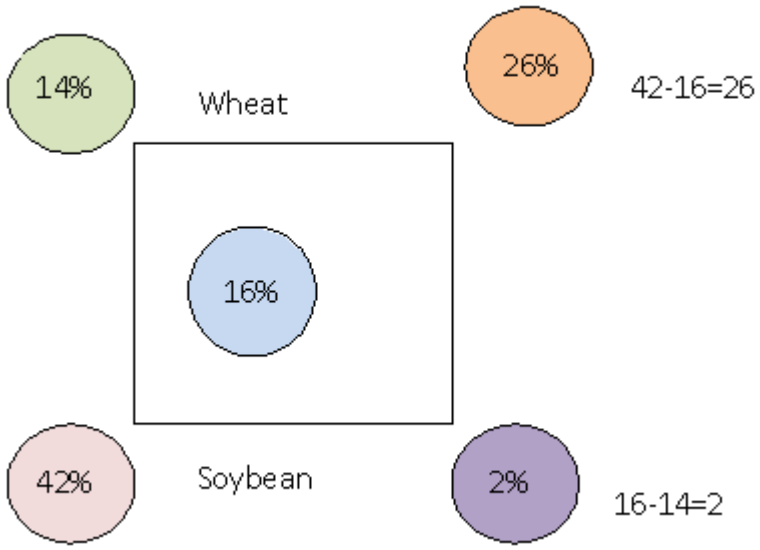
Step 3: Choose Grain 1 and write its protein percentage in the upper left corner



Step 4: Choose Grain 2 and write its protein in the lower left corner



Step 5: Choose the values from the upper left corner and the centre of the square and subtract from each other. Then do the same with the values from the lower left corner and the centre of the square.



Step 6: Determine the total parts.

26 units wheat

2 units soybean

= 28 mixed feed units

Daily Nutrient Requirements for Maintenance, Growth and Fattening of Steers.

Live mass	ADG (kg/day)	Energy requirements in MJ ME: Energy concentration in MJ ME/kg DM of ration fed						CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
		8	9	10	11	12	13					
150	0.00	22	22	22	22	22	22	230	130	5	5	6
								460	270	13	11	8
	0.25	29	29	28	27	27	27					
								515	320	14	12	9
	0.50	38	36	35	34	33	32	560	365	19	15	9
								600	410	25	18	9
	0.75			43	41	40	38					
	1.00				50	48	46	640	455	31	21	9
	1.25					58	56					
175	0.00	24	24	24	24	24	24	260	150	5	5	7
								485	285	12	11	8

Live mass	ADG (kg/day)	Energy requirements in MJ ME: Energy concentration in MJ ME/kg DM of ration fed						CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
		8	9	10	11	12	13					
	0.25	32	31	30	30	29	29	525	325	14	13	10
								570	370	19	16	10
	0.50	41	39	38	37	36	35					
								610	415	24	18	10
	0.75		49	47	45	43	41					
	1.00			56	54	52	50	650	460	29	21	10
	1.25				66	63	60					
200	0.00	27	27	27	27	27	27	300	170	6	6	8
								510	300	10	10	12
	0.25	35	35	34	34	33	33					
								555	345	14	13	12
	0.50	44	42	41	39	38	37	610	395	19	16	13
								655	445	23	18	13
	0.75		53	50	48	46	45					
								700	495	27	20	13
	1.00			61	58	55	53					
	1.25				70	67	64	750	545	31	22	13
	1.50					81	77					
225	0.00	29	29	29	29	29	29	325	185	7	7	8
								525	310	11	11	13
	0.25	37	37	36	35	35	34					
								580	360	14	13	13
	0.50	47	45	44	42	41	40	645	420	18	16	13
								700	475	24	19	13
	0.75		56	53	51	49	48					
								745	530	28	22	13
	1.00			65	62	59	57					
	1.25				75	71	68	810	590	32	23	13
	1.50					86	82					
250	0.00	31	31	31	31	31	31	350	200	8	8	9
								570	330	12	12	14

Live mass	ADG (kg/day)	Energy requirements in MJ ME: Energy concentration in MJ ME/kg DM of ration fed						CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
		8	9	10	11	12	13					
	0.25	40	39	38	38	37	36	635	375	13	13	14
	0.50	51	49	47	45	44	43	715	430	18	16	14
	0.75		60	57	54	52	51	790	485	24	20	14
	1.00			69	65	63	60	855	540	30	23	14
	1.25				79	75	72	915	595	34	25	14
	1.50					91	87					
300	0.00	36	36	36	36	36	36	405	230	9	9	10
	0.25	46	45	44	44	43	43	595	345	13	13	16
	0.50	57	55	53	51	50	49	660	390	16	16	16
	0.75	72	66	64	61	59	57	735	440	19	18	16
	1.00		81	77	73	70	67	805	495	24	21	16
	1.25			93	88	83	80	875	550	28	23	16
	1.50				107	101	96	925	600	33	27	16
	1.75					124	112	965	655	37	30	16
350	0.00	40	40	40	40	40	40	455	260	10	10	12
	0.25	51	49	48	48	47	47	690	400	15	15	18
	0.50	63	60	58	56	55	54	745	440	17	16	18
	0.75	78	73	70	67	65	63	800	480	19	17	18
	1.00		89	84	80	77	74	855	525	22	19	18
				103				905	570	25	21	18
								945	615	30	26	18
								985	670	34	30	18

Live mass	ADG (kg/day)	Energy requirements in MJ ME: Energy concentration in MJ ME/kg DM of ration fed						CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
		8	9	10	11	12	13					
	1.25				97	92	88					
	1.50				117	110	105					
	1.75					135	128					
400	0.00	45	45	45	45	45	45	510	290	11	11	13
								715	415	15	15	19
	0.25	56	55	54	53	53	52	770	455	17	17	19
	0.50	70	67	65	63	61	60	850	510	19	18	19
								900	555	21	20	19
	0.75	85	80	77	74	72	69	950	600	24	22	19
	1.00		99	93	89	85	82	990	645	27	24	19
	1.25			112	105	100	96					
	1.50				127	120	115	1030	700	30	26	19
	1.75					147	139					
450	0.00	49	49	49	49	49	49	545	310	12	12	14
								765	445	16	16	20
	0.25	61	60	59	58	57	56	840	495	18	18	20
	0.50	75	72	70	68	67	66	900	540	19	19	20
								950	585	20	20	20
	0.75	91	87	83	80	78	76	1000	630	24	23	20
	1.00		106	100	95	91	88	1040	675	26	24	20
	1.25			120	114	108	104					
	1.50				137	130	124	1075	730	28	25	20
	1.75					158	150					
500	0.00	54	54	54	54	54	54	595	340	13	13	15
								810	470	17	17	23

Live mass	ADG (kg/day)	Energy requirements in MJ ME: Energy concentration in MJ ME/kg DM of ration fed						CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
		8	9	10	11	12	13					
	0.25	67	65	64	63	62	62	890	525	18	18	23
	0.50	82	79	76	74	73	72	940	565	19	19	23
	0.75	100	94	90	87	84	82	990	610	20	20	23
	1.00		114	108	103	99	95	1030	650	22	22	23
	1.25			129	123	117	112	1060	690	24	24	23
	1.50				147	140	133	1105	750	26	26	23
	1.75					170	161					

Daily Nutrient Requirements of Breeding Stock in a Beef Herd.

Live mass (kg)	Daily gain (kg/day)	Min DM consumption (kg/day)	Roughage (%)	ME (MJ)	CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
Pregnant yearling heifers - last 3 to 4 months of pregnancy									
325	0.4	6.6	100	53	580	340	15	15	19
	0.6	8.5	100	68	750	420	18	18	23
	0.8	9.4	85-100	84	850	500	22	20	26
350	0.4	6.9	100	55	610	350	15	15	19
	0.6	8.9	100	71	780	450	19	19	25
	0.8	10	85-100	88	880	510	22	21	28
375	0.4	7.2	100	57	630	360	15	15	20
	0.6	9.3	100	74	810	460	19	19	26
	0.8	11	85-100	92	960	550	22	22	31
400	0.4	7.5	100	59	650	380	16	16	21
	0.6	9.7	100	77	840	480	19	19	27
	0.8	11.6	85-100	96	1010	500	22	22	33
425	0.4	7.8	100	62	690	400	16	16	22
	0.6	10.1	100	80	880	500	19	19	28
	0.8	12.1	85-100	100	1050	600	22	22	34
Dry, pregnant mature cows - middle third of pregnancy									
350		5.5	100	45	320	150	10	10	15
400		6.1	100	50	360	170	11	11	17
450		6.7	100	54	390	190	12	12	19
500		7.2	100	59	420	200	13	13	20
550		7.7	100	63	450	220	14	14	22
600		8.3	100	67	490	230	15	15	23
Dry, pregnant mature cows - last third of pregnancy									
350	0.4	6.9	100	55	410	190	12	12	19
400	0.4	7.5	100	60	440	210	14	14	21
450	0.4	8.1	100	64	480	230	15	15	23

Live mass (kg)	**Daily gain (kg/day)**	**Min DM consumption (kg/day)**	**Roughage (%)**	**ME (MJ)**	**CP (g)**	**DP (g)**	**Ca (g)**	**P (g)**	**Vit A '000 IU**
500	0.4	8.6	100	69	510	240	15	15	24
550	0.4	9.1	100	73	540	250	16	16	26
600	0.4	9.7	100	77	570	270	17	17	27
Cows nursing calves - average milking ability - first 3 to 4 months post partum									
350		8.2	100	67	750	440	24	24	19
400		8.8	100	71	810	480	25	25	21
450		9.3	100	76	860	500	26	26	23
500		9.8	100	80	900	530	27	27	24
550		10.5	100	85	970	570	28	28	26
600		11	100	89	1010	590	28	28	27
Cows nursing calves - superior milking ability - first 3 to 4 months post partum									
350		10.2	100	88	1110	650	45	40	32
400		10.8	100	92	1170	690	45	41	34
450		11.3	100	97	1230	720	45	42	36
500		11.8	100	102	1290	760	46	43	38
550		12.4	100	106	1350	790	46	44	41
600		12.9	100	110	1410	830	46	44	43
Bulls - growth and maintenance (moderate activity)									
300	1	8.8	70-75	85	900	550	27	23	34
400	0.9	11	70-75	105	1030	620	23	23	43
500	0.7	12.2	80-85	113	1070	620	22	22	48
600	0.5	12	80-85	110	1020	600	22	22	48
700	0.3	12.9	90-100	116	1080	600	23	23	50
800	0	10.5	100	88	890	500	19	19	41

Live mass (kg)	Daily gain (kg/day)	Min DM consumption (kg/day)	Roughage (%)	ME (MJ)	CP (g)	DP (g)	Ca (g)	P (g)	Vit A '000 IU
900	0	11.4	100	96	990	550	21	21	44
1000	0	12.4	100	104	1050	600	22	22	48

Minimum DM consumption is based on the general type of diet indicated in the roughage column.

Approximately 0.4 kg of weight gain over the last third of pregnancy is accounted for by the products of conception

Avg milking ability = 5 kg per day, Superior milking ability = 10 kg per day

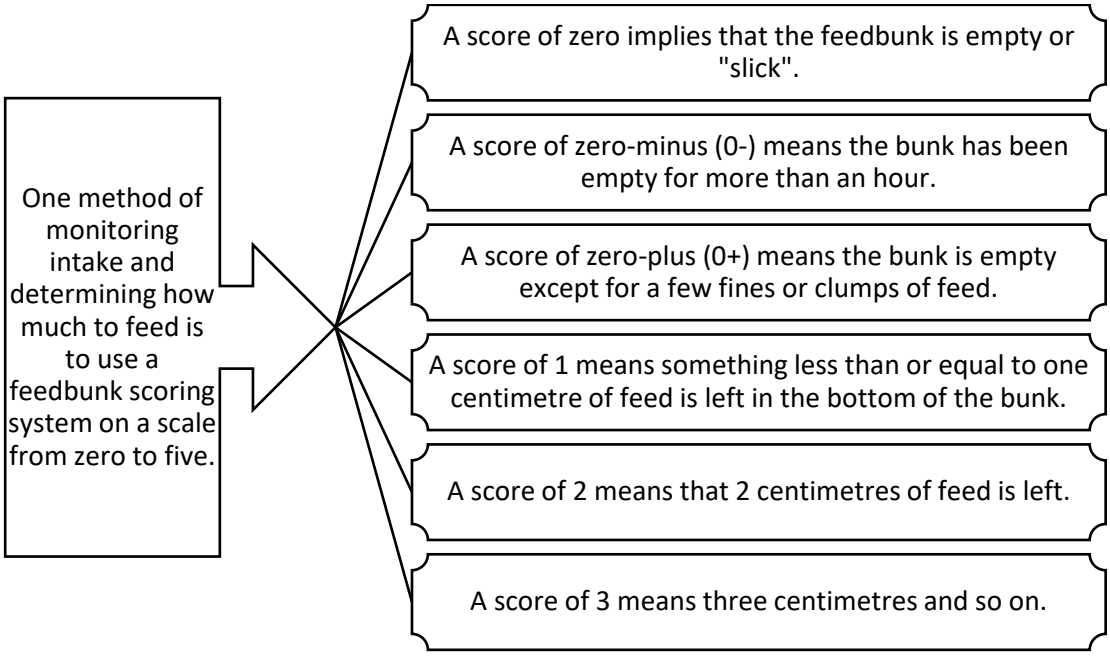
Roughage = good quality roughage containing at least 8 MJ ME/kg

Determining The Daily Feed Consumption

As we discussed earlier one of the most critical aspects in the management and operation of the feedlot is the correct application of the correct amount of feed and correct blend of feed to the different groups of cattle in the different feed bunkers. All feedlots should therefore design and implement a process whereby they can easily and effectively differentiate between the different feed bunkers in the feedlot and the different requirement of each bunker.

By minimising digestive disorders, we can keep cattle on feed and maximise performance. Poor bunk management and not the ration being fed can be "the first domino to fall" resulting in digestive disturbances such as bloat, acidosis, and liver abscesses. Cattle feeders should strive to have uniform day to day consumption of fresh, high-quality feed. The bunk management tools described below can aid in preventing large fluctuations in intake caused by acidosis and recovery from a bout of acidosis.

Determining how much feed to offer requires a certain amount of skill and good judgement. Cattle are big fermentation vats and fermentation vats work best under constant conditions. Careful bunk management during the winter months when is especially important since weather conditions alter consumption patterns.



Normally, if the score is zero for two consecutive days, you must increase the feed delivered to cattle by 5-10 percent. If the score is two or more, you must reduce the feed offered by 5-10 percent.

To accurately manage the different feed bunks a feed bunk sheet system should be in place for each feed bunk. A bunk sheet should have a place for date, pen of cattle, amount of feed delivered and a bunk score. A feeder should have at least 4 days of records whenever determining how much feed to put in the bunk.

Scoring bunks should be done the same time each day. Looking back, the bunk score, combined with the amount of feed provided can tell you if intakes are going up, coming down or holding steady. Scores constantly in the 2 to 3 range may lead to feed wastage and reduced feed efficiency due to the possibility of large fluctuations in feed intake.

In order to put together a feeding schedule for cattle, it is necessary to be informed about the requirements of animals and the properties of feeds that are available. In practice ignorance about feeds often leads to animals being fed either too much or too little with economic losses as a result. The most effective manner in which to determine the amount of feed needed accurately is by using a bunker scoring system as we discussed during previous sessions.

Recording daily consumption is important as this determines the amount of feed needed. Daily feed consumption is determined according to recent consumption. Monitoring and recording of consumption is therefore essential, enabling the producer to distribute correct amounts of feed. Feed calls should be made prior to the morning feeding, with two additional observations made during consumption of the first feeding and one in the afternoon feeding. Although the amount of feed offered

never should be increased by more than 10%, decreasing feed offered by 10% might be warranted to ensure that cattle clean up feed remaining in the bunk before it spoils.

Feeding practices and time of feeding can also differ from feedlot to feedlot; commonly cattle will be fed in the morning and in the late afternoons with less feed being distributed in the afternoons if the morning's ration was not finished. But some feedlot has found that daily DM (dry matter) intake can be increased during the winter months or colder periods by feeding cattle only once a day late in the afternoon. The reasons for this are not always clear and each feedlot manager should adjust his feeding practices and times to best suit his cattle.

Determining Water Consumption Levels

The first essential nutrient for living organisms is water. Whereas an animal can survive for days without food, a lack of water can cause death within a matter of hours. In the case of cattle and sheep, an animal can stay alive for up to 3 weeks without food but can live for two or at most three days if not provided with drinking water. High temperatures, as are often experienced during dry periods, increase stress related to a water shortage.

The data in the table below provides a guideline to water requirements of livestock based on a number of assumptions, including:

- environmental temperatures are not excessively high
- the water provided is relatively clean
- the water is palatable
- animal activity is average
- dry matter intakes (and consequently growth rates) are average.

In the case of cattle, the European breeds have a slightly higher daily water need than indigenous breeds. European cattle will consume 3 kg of water per kg of dry matter consumed at an environmental temperature of 5°C, and will drink about 8 kg of water per kg dry matter intake at an ambient temperature of 32°C. With sheep, the voluntary consumption of water is two to three times the intake of dry matter. The daily water intake of sheep can be 12 times greater in summer than in winter. The data in Table 16 should therefore be used as a guide only. Local conditions, including temperatures, wind speed and water quality, could change these figures substantially.

Where livestock are fed concentrates, water is contaminated by feed adhering to the muzzles of the animals. Contaminants enhance the growth of microbes in the water, which reduces the palatability of the water and can lead to diseases. For example, some algae growing in water cause photosensitivity in cattle. It is therefore essential that animals have constant access to clean water ensured by regular

cleaning of water troughs. For efficient water utilization, drinking troughs must be correctly designed (See previous learning unit).

It is recommended that water troughs are cleaned at least once every three days, but in the feedlot situation, to encourage feed intake, daily cleaning is warranted. Water should be tested for salt content as the most common reason for poor palatability of water is a high content of salts.

To ensure that a water shortage does not adversely affect animal performance, livestock must have constant access to water. Drinking troughs must be checked daily and, as a precaution, a back-up system is important. With a large water reticulation system, the primary reserve should contain at least 8 days' supply and the secondary reserve (between the main water reserve and the drinking points) at least a 2-day supply of water. It is useful to keep water carts on standby for emergencies.

Table. Water requirements of livestock, excluding waste, and assuming that the water is clean and palatable.

Class of livestock	Requirement (R/animal/day)
CATTLE	
Cow	40 to 50
Bull	45 to 55
Dairy cow	5 per R of milk
Yearling	25 to 40
Calf	15 to 25
SHEEP	
Dry ewe	8
Ewe with lamb	11
Ram	11
Lamb	2 to 4
PIGS	
Dry sow	5 to 9
Lactating sow	18 to 23
Boar	9
Baconer	5 to 9
Piglet (4 to 5 weeks)	4 to 5
POULTRY	R/100 birds/day
Layers	20 to 40
Broilers	10 to 15

Class of livestock	Requirement (R/animal/day)
Pullets	15 to 20
Chicks	
- up to 2 weeks	8 to 11
- after 2 weeks	

Feedlots are places where cattle are forced to live in close proximity to each other in an unnatural environment for them. This close proximity of cattle from, often, a range of sources creates ideal circumstances for the spread of sickness and diseases. To lessen the risk of the diseases and sicknesses spreading a thorough and well-designed cleaning programme must be implemented within each feedlot.

Research has also shown that the weight gains of cattle fed spoilt feed declines rapidly. This gives us another reason to make sure that cleaning is done regularly and in a set manner. Clumps of feed left over in the bunkers are likely to spoil and create conditions that can negatively affect the weight gaining process. Similarly, dirty water can create ideal condition where diseases can spread and multiply with astonishing speed throughout the entire feedlot.

To determine the collective water consumption of the cattle in a feeding pen or a feed bunker one needs to be firstly aware of how much water was given to the cattle in each pen. Normally water troughs are refilled once a day after cleaning and a feedlot manager should be well aware then of how much water was left in each trough before cleaning and how much water each trough contains.

Many producers overlook the importance of water availability as it relates to bunk management, including the amount of water, space provided, and the location of water sources. Problems that limit water intake also can limit feed intake, and this, in turn limit overall animal performance. Poor water quality or lack of water can cause cattle to go off feed quickly. Feed callers need to recognise this problem before making any drastic changes in the amount of feed offered. In free-stall barns, 3 inches of linear space per cow and one watering space (or 2 feet of tank perimeter) for each 15 to 20 cows are recommended. A water depth of 6 to 8 inches is suggested to help keep the water fresh and easier to clean, because less debris accumulates. As temperature and humidity goes up, more water is required. During months of hot weather, water supply becomes an important issue. Adding water tanks for the summer can help in the feedlot.

The following table gives an indication of the amount of water needed per head of cattle per day at different temperature.

Water requirements for feedlot cattle (Litres/Day)

Animal Type	Weight (kg)	Temperature	
		5°C	21°C
Growing Calves	180	15 litres	22 litres
	270	20 litres	30 litres
	360	24 litres	35 litres
Finishing Cattle	360	28 litres	41 litres
	450	33 litres	48 litres

Identifying The Quality Of Feeds And Water

Refer to LU 1 of this module for Quality Management in Animal Feeds

Procedures For Feed Mixing

Refer to Part 1 of this course.

Collecting and Distributing Feed in Feedlots

Any feedlot consists of a range of different feeding bunkers and loading points for those bunkers. Most commonly feedlots will have a range of cattle at different stages of development and health therefore requiring different amounts and type of feed. These different groups of cattle are normally grouped together, like by like, to ensure that each group's specific dietary needs are met.

For instance, in most feedlots young cattle arriving at the lot will be fed on a diet consisting of roughage only for a week or two to kick start the weight gaining process. As the cattle settle into their routine of feeding their dietary needs will change and so will the amount of feed needed in order for them to maintain a steady weight gain.

The purpose of the feedlot is too quickly, and cost effectively fatten cattle to a point where their body mass and fat content reaches the levels required by the market. It is therefore very important for the feedlot operator to be able to effectively adjust feed blends and amounts, when needed, to the different groups of cattle within the different loading bunkers.

To determine the needs and dietary requirement of each feed bunker and load point most feedlots will employ a scoring system whereby the amount of feed needed as well as the blends required in each feedlot can be effectively measured and regulated. It is therefore critical that we must be able to differentiate between the different feed bunkers and feed loading points in order to ensure that the correct amount and type of feed is delivered to the correct feed bunker at the correct time.

This knowledge of the different feed bunkers and loading points within the feedlot is therefore a critical part of the successful operation of the feedlot and workers loading feed into the feed bunkers must therefore be fully conversant on the different locations of the different loading points.

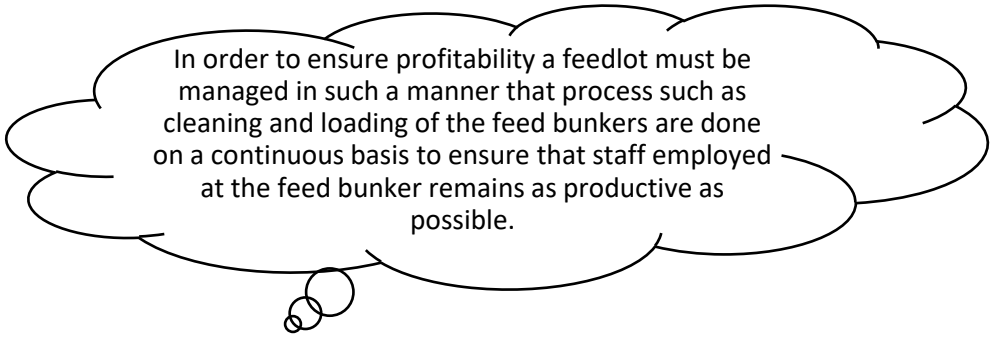
Feedlots most commonly will have different loading points for feed destined for different bunkers. The person responsible for the collection and distribution of the feed to the bunkers must therefore be fully aware of where the food required for the specific bunkers that needs to be refilled must be loaded. Where only the three main blends namely a starter blend, a growth blend and a finisher blend

are used the implementation of a colour coded system seems the best way to ensure that the correct feed goes to the correct bunkers.

When designing and developing a colour scheme the loading points containing the different feed blends should be colour coded. The same colour code should then be used on the feed bunker cards to ensure that the driver of the tractor delivering the feed to the feed bunkers can easily check and ascertain that the correct feed are going to the correct bunkers.

Loading Feed In The Correct Sequence

Most cattle lots consist of a large range of feed bunkers with, as we discussed earlier, a range of different cattle groups at different stages of development with different dietary needs.



This means that some feedlots have started to move away from the once daily morning feeding that has become common practice in most feedlots in South Africa to a more regular daily feeding time fitting into the production and cleaning schedule. There still also are cases where animals need to be fed twice daily, especially during the starting period and during summer months.

As we will discuss later on cleaning of the feed bunkers needs to be done daily and this necessitates the emptying and refilling of the bunkers. It therefore makes sense for the feedlot manager to schedule the distribution of feeds to coincide with the refilling of the bunkers after cleaning.

Loading the feed to be distributed in the correct sequence to ensure that bunkers are refilled directly after cleaning; therefore, becomes very important. The persons responsible for the refilling of the feed bunkers, the tractor drivers and the load pint operators, must be fully versed with the cleaning schedules of the various bunkers and ensure that feed are timeously loaded and distributed in the correct sequence.

Loading the Correct Ingredients

As we discussed earlier in the guide it is important that the correct amount of feed is delivered to the correct bunker. The driver of the tractor used to load the feed bunkers must therefore be fully aware of the amount of feed required to perform the task.

The common practice is to load the feed wagon or truck only with the correct load size or amount of mixed feed necessary to refill the section of feed bunkers in question. A driver will therefore only load enough feed to complete the section and return to the loading bay to reload for the next section of bunkers. This practice ensures that the correct amount of feed are delivered to the correct bunkers. It eliminates the likely hood off over feeding and therefore spoilage of feed.

Different feed bunkers will be stocked with different groups of cattle. This practice means that not all feed bunkers will receive the same amount or blend of feed and therefore the management of the feeding process, starting by managing the loading of the distribution wagon or trailer, are another important step in assuring that the different groups of cattle are fed according to their specific needs.

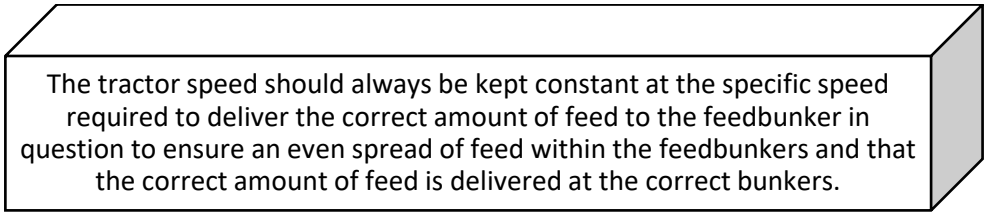
As with the distribution of the feed to the bunkers it is also important that the correct feed mixes are supplied to the correct bunkers. To ensure this a system of bunker management in which bunker charts are used must be designed and employed. Each bunker chart must correctly identify the group of cattle within the feed bunker and their dietary needs.

The driver loading the bunker should always then double check that he has loaded the correct feed ingredients for the specific bunker as it is specified on the bunker charts. Feeding the incorrect blend of ingredients to wrong group of cattle can lead to major financial losses for the feedlot.

Distributing the Feed

Feedlots are most often designed in such a manner that feed bunkers are filled by using a tractor. The tractor will pull a trailer that slowly and evenly discharges the feed into the feed bunkers. This simple operation though can be another determining factor in the success of the feedlot as the speed at which the tractor is driven determines the amount of feed distributed to each feed bunker.

As with all other operation within the feedlot it is important that the tractor operator is fully trained and made aware of his responsibilities and the consequences of him or her not performing their tasks to the best of their abilities.



In large feedlots feed is usually distributed to the feed bunks with a mixer truck or feed wagon. Loading feed from a mixing trench is accomplished with a front-end loader. The loader scrapes a slice of feed

and loads the feed into a mixer feed truck or wagon. With a reasonable amount of care and attention during this process, losses can be minimised.

The most common way of ensuring that the correct amount of feed is supplied to the correct bunkers, is by adjusting the speed of the tractor supplying the feed to the different bunkers. The speeds used by the tractors differ greatly from feedlot to feedlot and is dependent on the design of the feedlot and the distribution method use by the feeding wagon or trailer. It is therefore critical that the feedlot manager determines the different speeds necessary and unique to the feedlot to ensure that the right amount of feed is distributed to each feed bunker.

As a general rule the faster the tractor drives the less feed will be added to the feed bunkers and vice versa. It is critical though to remember that feed must always be distributed evenly throughout the bunker to allow all the cattle in the pen to have equal access to the right amount off feed. The training of tractor operators and ensuring that they have the necessary understanding of their roles and responsibilities, is therefore of cardinal importance.

This is a critical part in ensuring the success and ultimate profitability of the enterprise and must therefore be given the necessary attention. The operation and success of a feedlot is dependent doing a number of small things well, you can have the best feed and best and most modern feed bunkers but without the correct loading of the correct feed at the correct time you will not be successful.

Feeding and Water Troughs

Water Troughs

The amount of trough space available when providing watering facilities or feeding livestock significantly influences the performance of livestock. Drinking troughs warrant special attention because an excessive amount of water is wasted when troughs are cleaned regularly, as is necessary for good management. Furthermore, poor design results in animals falling into troughs and drowning. It is not uncommon for cattle to fall onto their backs in a trough and dying if they cannot get up. Water trough design must take the following into consideration:

- Water troughs must be easy to clean
- a straight trough is easier to clean than a round or circular trough because a broom can be pushed through it with ease
- a drain plug which is tamper-proof is needed to allow easy drainage
- the water inlet must include a tap so that the water supply can be turned off to drain the trough. Siting the tap well away from the trough prevents damage to the tap.
- An ideal width is about 20 cm. This allows animals to drink with ease and minimizes the danger of animals falling into the trough.

- Where the sides of the trough are broad, as with concrete troughs, the edge of the trough must slope towards the water. This discourages animals from placing their hooves into the trough.
- The height of the trough above the surrounding ground should be 20 to 40 cm, with the water level in the trough not more than 10 cm deep.
- The trough should be anchored to the ground to prevent animals knocking it over.
- Pipes to and from the water trough must be protected to prevent animals hurting themselves, as well as to prevent damage to the pipes.
- The water supply and delivery pipes to the drinking water should be large enough to ensure that animals do not drain the trough when they drink. Once a water trough is empty, animals start bumping it in their impatience to get water.

Feed and Lick Troughs

A feed bunker is the trough or bunker in which the feed is placed for the animals to feed from. Good feed bunk design is essential to optimising DM (Dry Matter) intake. Cattle should have 60 to 75 cm of bunk space each to allow all of them to feed at the same time. The feed bunk or feed pad should be 10 to 15 cm higher than the alley where the cattle are standing. Cattle consuming feed at ground level waste less feed.

In addition, the condition of the feeding surface can also affect DM intake. Feed bunks must have smooth surfaces. Surfaces without grooves or holes that can trap feed are easier to clean and help reduce build-up of waste feed, mould growth and odour.

Another important factor is to avoid muddy conditions and manure build-up on feed bunk aprons. These conditions can decrease palatability of the ration as well as increase the transmission of disease.

Feed and lick troughs can be made from almost any material. Inverted rubber tyres have become very popular because they do not rust and cannot cause injury to animals, are cheap and readily available.

Prior to the start of feeding, animals must be grouped according to size of animal and age group. By dividing livestock into production groups, feeding is simplified because each group can be fed a ration suited to its requirements. Separating animals into groups overcomes the problem of larger animals dominating at feed troughs and preventing smaller animals from obtaining their allocation of feed. Especially where feed is rationed, adequate trough space is essential to prevent smaller animals from losing mass and condition, while larger animals get over fat.

Where trough space is limited, cattle can cause damage to troughs or turn them over when they butt each other in an effort to reach the food. Damage to troughs and the loss of food is reduced if troughs are firmly anchored to the ground.

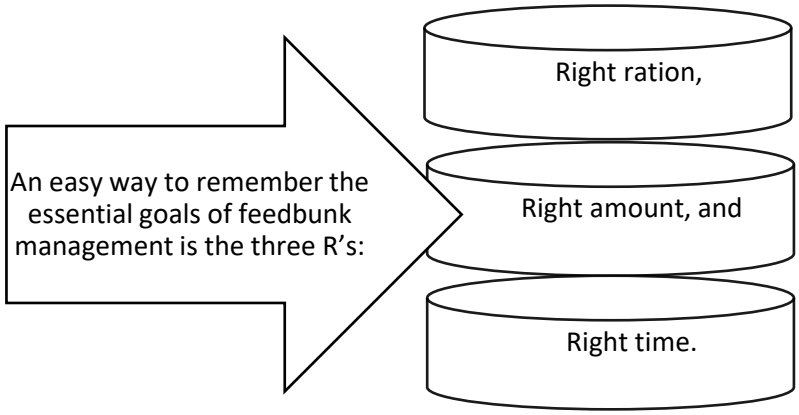
Feed- and water through space requirements for different classes of livestock.

Class of livestock	**Trough space required per animal (mm/animal)**	
	Feed	**Water**
CATTLE		
Horned mature cattle	600	Rule of thumb:
Dehorned mature animals	250	Provide space for 10% of a herd
Ad lib feeding	200	@ 400 mm per polled cow
Lick troughs	15 polled animals per lorry tyre	or 200 R drum with 25 mm pipe per 50 animals
SHEEP		
Intensive feeding	100	10 (this = 100 / 10% of ewes)
PIGS		
Mature	600	
Baconer	300	
Piglets	225	
POULTRY		
Layers	50	
Broilers & pullets	25	
Chicks		
- up to 2 weeks	10	
- over 2 weeks	15	

Recording The Ingredients Mixed Into The Feeds

No feedlot manager or operator will be able to make decisions about the adjustment of feeding practices without the necessary information being available to him or her. The only way in which the necessary information can be gathered is through the implementation of a thorough and well managed recordkeeping system.

Effective feed bunk management is a key component in accomplishing the goals of any cattle feeding program.



It is therefore important that the correct bunker location and the practices applicable to the feed bunk are accurately recorded to carry out the three R's.

Only through analysing the records and scoring system of each bunker can a feedlot manager then decide where to adjust feeding practices to optimise results.

The success of feedlot practices is dependent on various factors from the quality of ingredients used to feed the cattle with to the amount of feed supplied and the times at which the feed are supplied. Other external factors can also have an effect on the feeding patterns of cattle, such as climatic conditions and so forth. Only through the collection of complete and intensive records and the capturing of these records will a feedlot manager or operator be able to make informed and well thought out decisions concerning the operation of his feedlot.

It is important that a feedlot manager have the ability to predict the effect that certain changes in practices will have on the performance of the feedlot. The effects that changes in feed ingredients, such as the seasonal availability of certain concentrates, must be judged before-hand in order to determine the effect that these changes will have on the profitability of the enterprise. The only manner in which the feedlot operator or manager are able to make these predictions is through the analysis of records and the compilation of historical data obtained from these records.

Recording The Amount Of Feed To Animals

It is important that a record of loads discharged be accurately reported and recorded to maintain a correct feeding schedule. If the loads discharged into feeding bunkers are not recorded correctly it can lead to the wrong information being used to adjust the feeding practices.

Earlier in the guide we looked at the importance of loading the correct amount of feed onto the feeding wagon when refilling the feed bunkers. If this practice is closely monitored and recorded the accuracy of the entire feeding process can be increased. Records of the amount of feed distributed to each bunker is another critical step in assuring that the success of feeding practices can be measured and practices adjusted where necessary.

Failure to correctly record the amount of feed discharged into the feeding bunkers can lead to a feedlot manager or operator taking drastic steps. For example, a sudden loss of appetite can mean that cattle are sick or that the feed blend being used is of a poor quality forcing the feedlot manager to implement costly changes in the feed blend or scheduling treatment or vaccinations. If the seeming loss of appetite is only indicated due to the wrong information being recorded the feedlot can easily occur unnecessary expenses that can influence the ultimate profitability.

If the necessary information concerning the amount of feed discharged at each bunker is not recorded a feedlot operator or manager will not be able to make the adjustments to the feeding practices as needed. The livestock feedlot industry has become a highly skilled and competitive industry in which only the best feedlots are able to survive and flourish.

To ensure the survival and profitability of the feedlot a manager must be able to make well thought-out and informed decisions and the only manner in which to accomplish this is by the design and implementation of well-structured recordkeeping system. Going hand in hand with the recordkeeping system is the capturing and analysis of the data obtained from the records. The analysis and capturing of recorded data give the feedlot manager a tool that can be used to track trends and thereby measure the success of feed volumes and feed blend quality.

Stock Control Of Feed Ingredients And Ordering Feed Ingredients

Any feedlot's ultimate goal is to be profitable and sustainable. As with any other business, times will come when the market price places pressure on the profitability of the enterprise. This is a naturally occurring cycle and similar to nature this process eliminates the weak and identifies the strong.

A strong feedlot is a feedlot that keeps control of all the various elements that can have an effect on the quality of the cattle and the ultimate profitability of the enterprise. One of these factors that are

a necessary but large expense for the feedlot is obtaining the ingredients used on the feed blends. As we discussed earlier these ingredients consist of a variety of elements from roughages to concentrates to additives such as vitamins and minerals.

In order to ensure that the feedlot does not undergo any unnecessary expenses and thereby negatively influencing profitability strict control should be kept of these ingredients. The only effective manner in which to control the levels of the ingredients is to employ a well detailed and structured recordkeeping system where all the ingredients obtained and where the ingredients was used can be captured.

A stock control system can help to ensure that the profitability of the feedlot improves and that the right ingredients are available when needed. To effectively develop a stock control system a feedlot manager should determine minimum and maximum stock control levels for each separate ingredient.

The setting of minimum and maximum stock levels helps in maintaining the quality of the stock as well as ensuring that the necessary ingredients are available for use when needed. Over ordering of stock can lead to ingredients deteriorating before use thereby leading to stock having to be destroyed or discarded. On the other hand under ordering of stock can lead to ingredients not being available for blending when needed. Stock should be ordered once the stock level reaches the minimum level. The amount of stock ordered will be depended on the maximum stock level. So once stock reaches the minimum level enough stock should be ordered to bring the stock levels up to the set maximum level.

Ensuring that the right ingredients are available at the right time in the right amounts goes a long way to ensuring that the feedlot can maintain its profitability.

Cleaning Feed Bunkers And Water Troughs

The cleaning schedule will depend on the size of the feedlot. As it is best practice to feed cattle as early as possible in the morning cleaning are usually the first duty performed every day in the feedlot. The amount of cleaning teams employed for this duty varies between feedlots. It normally takes a well-trained cleaning team about 15 minutes to empty out, clean and sanitise a feed bunker and a water trough within a feeding pen.

The length of time necessary to refill feed bunkers and water troughs within the feedlot are then also used to decide the number of cleaning teams to be employed. If four cleaning teams are employed in a feeding lot that consists of sixteen feeding pens the cleaning process can then be completed in an hour with 4 teams cleaning one pen each at a time.

It is also important that feed bunkers and water trough are refilled as soon as possible after cleaning, therefore the cleaning and refilling processes must be scheduled in such a manner that they run concurrently to each other. In most instances it is good practice to clean one section of feeding pens

and as the cleaning teams move to the next section the refilling process can start in the previous section.

POE Activity 6

POE Activity 7

POE Activity 8

Part 2

Administer Treatment To Livestock

If you own livestock, at some point you will need to give them some form of medication or other treatment, whether it be a vaccine, an anthelmintic to combat parasites; medication to maintain their health or production or even branding them.

You should know how to administer these treatments safely, so you don't injure yourself or your animals.

In this part of the module we explore the following topics:

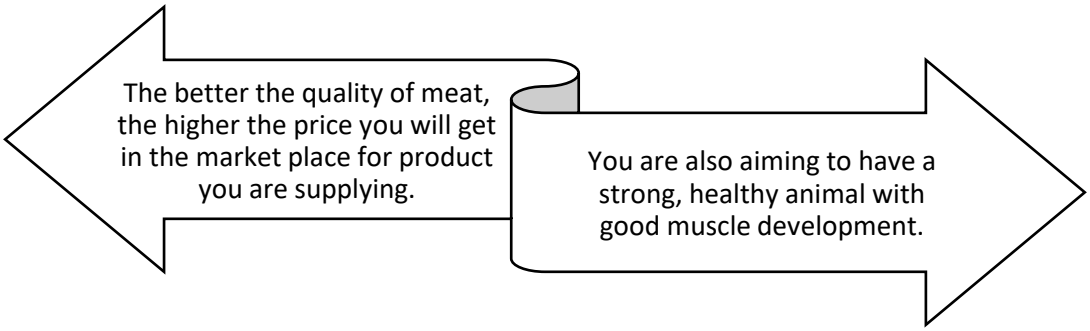
- Keeping herds safe, healthy and stress free
- Types of livestock treatments
- Tools, equipment and facilities for treatments
- Treatment procedures
- We will learn about administering the following treatments:
  - Marking cattle
  - Vaccination
  - Castration
  - Dipping
- We will also look at good handling procedure and transportation

Learning Unit 6

Administer Livestock Processing Treatments

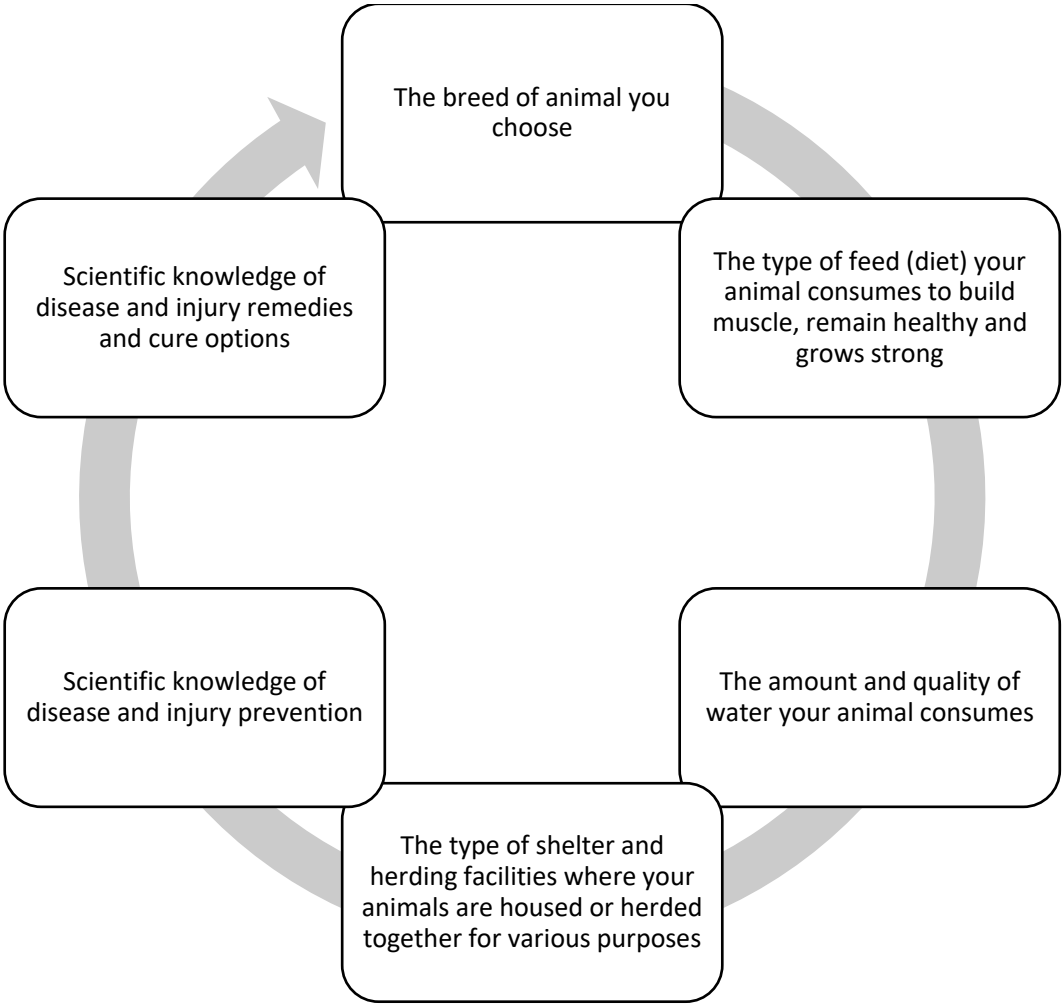
Why It Is So Important To Keep Your Beef Herd Safe, Healthy And Stress Free

The main purpose of farming with beef cattle is to raise an animal that can be slaughtered to provide high quality, healthy meat to feed humans.



Remember that the muscle development is what allows for weight and volume of the meat product that you are producing.

In order to ensure that your beef cattle are fit, well-muscled, and healthy and that you can eventually harvest the best quality meat from the carcass, you need to consider various factors in keeping the animals happy, healthy, safe and stress free.



Factors to consider in heard management for beef cattle

Understanding The Concept Of Livestock Treatments

Definition:

Livestock treatments: are any human, mechanical or chemical actions or interventions that take place during the production phase to ensure that the animal remains safe, identifiable and healthy. It also includes actions concerned with minimising problem animal behaviour that might cause injury to animals.

Types Of Livestock Treatments

Options available for beef cattle treatments:

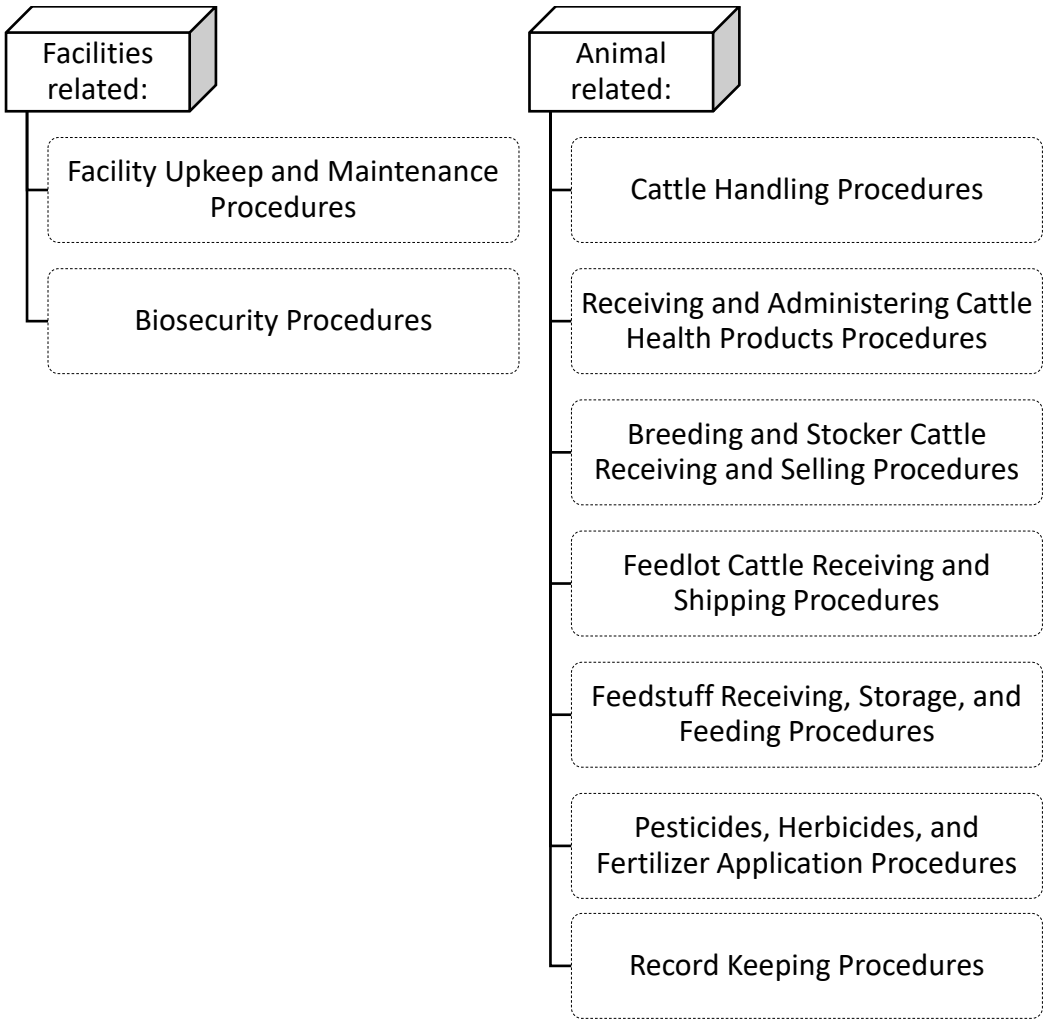
Safety and identification of animals in the herd	Injury prevention	Preventive and curative health
• Marking and / or Branding • Erecting fencing • Erecting pens and feedlots	• Thinking carefully about herd selection • Castration of steers to prevent natural male aggression • Dehorning of calves and steers to avoid injury during aggressive behaviour or when animals are closely confined (e.g. during transportation or in crushes). • Considering the design and layout of housing, feedlots, crushes and vehicles for transportation	• Vaccines • Grazing and feeding systems • Scientific supplements to diets • Volume and quality of watering systems • Medicines and other vet nary interventions such as selective breeding practice, artificial insemination, etc.

Correct Livestock Treatment Procedures

In order to understand all the elements related to livestock treatments, we have adapted information from the Samuel Noble Roberts foundation to create a comprehensive "best practice" checklist of all the procedures and elements to consider when administering livestock treatments for beef cattle.

This checklist is a practical working document, and we have attached it below

The main areas included in the checklist are as follows:



Facilities related checks and procedures:

Best practice check 01	Facility Upkeep and Maintenance Procedures
Objective of this best practice	To ensure upkeep and safety of the entire facility.

1.1 General Operating Procedures	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Dispose of trash and other debris in trash receptacles located throughout the facility.		
2. Keep all buildings clean. A broom, squeegee, scoop shovel, and a dustpan should be stored in		

each building, along with disinfectants and sanitizers.		
3. Always return supplies or equipment to their proper storage location.		
4. If a closed gate is entered, make sure the gate is closed back and latched when exiting.		
5. First aid kits should be located in every building on the facility- especially near the cattle processing facility.		
6. Phone numbers for local emergency, management, and veterinarians should be posted in each building and near the cattle processing facility.		

Best practice check 02	Bio-security Procedures	
Objective of this best practice	To reduce the chances of infectious diseases being carried onto the premises by both people and animals, and to reduce the spread of these diseases if they are present on the farm.	
2.1 Prevent the Introduction of Infected Animals	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Only bring in animals from known and respected sources.		
2. If possible, avoid purchasing animals that have been co-mingled with animals of another herd.		
3. If possible, avoid co-mingling of feedlot, stocker, and breeding cattle.		
4. Test all incoming bulls, cows, and heifers for infectious diseases (i.e. Bovine Viral Diarrhoea		

(BVD), Bovine Leukaemia Virus (BLV), Johne's, and Trichomoniasis) before introducing them to the herd.		
5. Only use known and respectable cattle transporting services.		
6. For hired transporters, ensure that they start out with a clean truck.		
7. Do not allow outside truck cleaning on the premises.		
2.2. Prevent the Introduction of Infectious Diseases	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Visitors should not be allowed in animal holding facilities without employee or management approval.		
2. Post a sign in a visible area to instruct visitors where to report or who to contact before entering any animal holding facilities.		
3. Upon arrival, visitors should sign in at a designated area.		
4. If possible, visitors should be provided with clean or plastic shoes/boots before being allowed in any animal holding facility.		
2.3. Prevent the Introduction of Infectious Diseases	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Reduce stress on animals caused by diseases through proper immunization. A proper vaccination and immunization program should be implemented according to veterinary recommendations.		

2. Reduce stress on animals caused by poor nutrition, uncomfortable housing, or poor air quality through proper management.		
2.4. Decrease Exposure to Infectious Diseases	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Isolate sick animals, especially animals with unfamiliar symptoms or those that don't respond to standard treatment.		
2. Remove dead animals from pens quickly and dispose of them properly.		
3. If birds or other predators become a problem, find the safest and most effective method to control them.		
4. When near cattle, NEVER use shotguns to control birds or for any other reason.		
5. For questions regarding 1-4, contact a veterinarian.		
6. Minimize manure contamination of hair coat, feed, and water by keeping pens, feeders, and water systems and troughs clean.		

Animal Related Checks And Procedures

Best practice check 03	Cattle Handling Procedures	
Objective of this best practice	To ensure all cattle are handled appropriately and treated humanely at all times to protect the animal as well as the handler. To eliminate the incidence of bruising, to avoid wild behaviour in animals, and to minimize equipment breakage and employee injuries.	
3.1 Cattle Working and Handling	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Prior to working or moving cattle, inspect the fences, chutes, corrals, and		

working facility to ensure proper care and ease of handling.		
2. Make all necessary repairs, including removing protruding bolts, nails, etc.		
3. Handle cattle gently and humanely at all times to avoid injury (i.e. bruises) or extra stress to the animals and injury to handlers.		
4. Prior to working cattle, do not get them excited. Move them slowly and quietly.		
5. Gather cattle from pastures quietly and in small groups.		
6. Before moving cattle through the handling facilities, ensure that all chains are tied up and trash is removed to prevent balking.		
7. When pushing cattle, only fill the crowd pen and tub half full.		
8. Keep cattle calm in the crowd pen, so that they will be calm coming into the chute.		
9. Use only paddle sticks to move cattle through the handling facility.		
10. Refrain from yelling, screaming, or making sudden movements near cattle.		
11. The only time a hotshot should be used is right before the cattle enter the squeeze chute. It should only be used if cattle will not move and after all other		

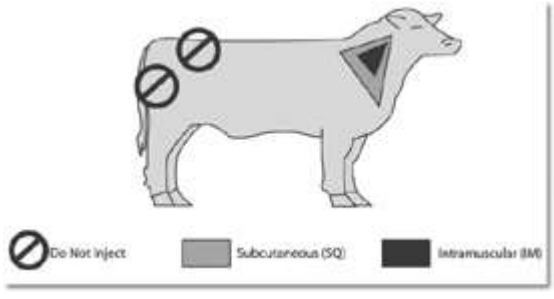
techniques have been employed. It should never be used excessively.		
12. When not in use, place the hotshot in a stationary place near the processing area.		
13. Remember that the goal is to have cattle walk into the squeeze chute and walk out.		

Best practice check 04	Receiving and Administering Cattle Health Product Procedures
Objective of this best practice	To ensure the proper handling, storage, and administration of all cattle health products, and to ensure proper record keeping for all treatments.

4.1 Receiving Health Products	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Purchase and use only DAFF / SABS approved health products for treating cattle.		
2. Record the purchase and use of cattle health products.		
3. Store the products according to label directions in the refrigerator or in a clean dry cabinet that can be locked. Do not store food in refrigerators that are used for animal medications.		

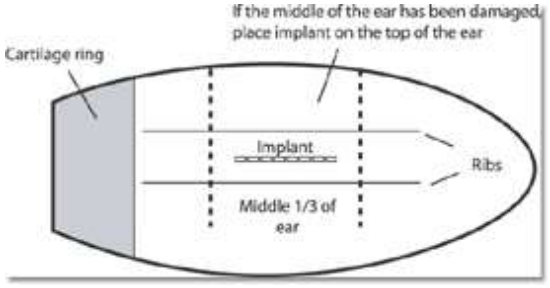
4. Maintain a temperature of 55-75 degrees Fahrenheit in the medication rooms.		
5. Place label inserts of all animal health products used in an Animal Health Product Labels binder.		
4.2A Before Administering the Product	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Get authorization from management before administering any products.		
2. Read label directions before a medication is used to ensure that the proper use, dosage, route of administration, frequency and timing of administration, withdrawal periods, and negative side effects are observed.		
3. For extra label drug use, consult a veterinarian, and follow withdrawal times set by the veterinarian. Only a licensed veterinarian working with a valid veterinarian-client-patient relationship (VCPR) has the option of using drugs off label.		
4. Check expiration dates on all products and check all products for contamination (possible discoloration or thickening) before use.		
5. Dispose of outdated and contaminated products in normal refuse containers and record disposal date.		
6. Read the label directions to determine how long a reconstituted vaccine can remain mixed before it is used. NOTE: Most modified live vaccines must be reconstituted by adding sterile water to a dehydrated "cake" in a separate sterile vial. Once the water is added, the viral organisms are fragile and will be "live" only for a short time. As a rule of		

thumb, only reconstitute enough vaccine to be used in 45-60 minutes.		
7. Record the number of needles removed from the needle storage. Immediately report to management if needle inventory shows needles unaccounted for. It could mean possible needle breakage in an animal.		
8. Ensure that needles and syringes are clean and not cracked or broken.		
9. Properly restrain the animal for all procedures.		
10. If the injection site is dirty, clean the site with water only before giving injections. Use a damp rag to rid the site of manure and/or mud.		
11. Record the individual or group treatment details before the animal or group is treated.		
4.2B Administering the Product	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Administer products strictly according to the label.		
2. Give all intramuscular (IM) and subcutaneous (SQ) injections in the neck; NEVER in the top sirloin (rump) or hindquarter.		
3. When possible, use SQ, intravenous (IV), and oral products instead of IM products.		
4. Use the tented method for SQ injections (lift the skin and slide the needle into the space created between the hide and the muscle layers).		
5. Do not administer more than 10 cc in any one injection site location. Space multiple injections 2-3 inches apart.		

6. Use separate, labelled syringes for each product.		
7. Never put a used injection needle back into a drug bottle.		
8. Clean syringes after use and before using a different drug in the same syringe. Do not use disinfectants to clean syringes for modified-live viral vaccine. Use water only. Soap residue will kill the virus.		
9. For processing stocker and feedlot cattle, change needles frequently (every 10-15 uses), or when bent, dull, burred, or dirty.		
10. For breeding cattle, change needles and palpation gloves after every animal is treated or examined.		
11. When treating sick cattle, change needles after every animal is treated.		
12. If a needle breaks off inside the animal during injection, immediately identify the animal and contact a veterinarian to remove the needle. If the needle cannot be found and removed, make a note of it. If the animal is going to be shipped for slaughter, inform the packer of the needle and send the animal to slaughter as a "suspect."		
13. Use only zero-day withdrawal products in the last 50 days before slaughter.		
Proper Injection Sites: 		

4.2C After Administering the Product	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Return all remaining products back to their proper storage location. Dispose of any unused, reconstituted modified live vaccines.		
2. Return any unused needles back to the needle storage container.		
3. Record the number of needles discarded and returned.		
4. Dispose of used sharps (needles and scalpel blades) in the container marked SHARPS and NOT in the regular garbage.		
5. When the sharps container is full, take it to a veterinarian and exchange it for a new one.		
6. Dispose of syringes and empty pharmaceutical bottles in the regular garbage.		
7. Properly clean the area.		
4.3 Implanting	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Store all implants according to label directions in clean dry cabinets or in refrigerators.		
2. Read label on all implants to ensure proper use.		
3. Properly restrain the animal. Refer to Best practice 3.0 for proper restraint technique.		
4. Before implanting, determine which ear to implant and adjust the implant gun so the needle can be positioned next to and parallel to the ear, with the slant side of the needle facing outward.		

5. Implant all calves in the same ear to minimize confusion.		
6. Clean the needle and implant site with a disinfectant before implanting to reduce contamination of the needle wound.		
7. Load the implants in the gun.		
8. Grasp the ear with one hand while the other hand positions the instrument parallel to and nearly flush with the ear. Put the point of the needle against the ear with the bevelled part facing outward.		
9. Insert the needle in the back-side of the ear, between the skin and the cartilage, in the middle third of the ear.		
10. If the middle of the ear has been damaged, place the implant on the top of the ear.		
11. If the tip of the ear is missing, place the implant in the outer part of the remaining ear.		
12. Use the tip of the needle to prick the skin, lift slightly and completely insert the needle under the skin.		
13. Depress the plunger of the implant gun and withdraw the needle.		
14. Gently feel the ear for the implant under the skin to see that it is inserted properly.		
15. If the implant is not inserted properly, contact a veterinarian.		

16. Proper Implant Position:  		
4.4 Blousing	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Select the bolus gun and bolus gun head of the size that best fits the bolus to be administered. Also, take into account the size of the animal when selecting the size of the bolus.		
2. Do not administer a large bolus to a small calf.		
3. Properly restrain the animal. Refer to best practice 3.0 for proper restraint technique.		
4. Load the bolus into the head of the bolus gun.		
5. Open the animal's mouth by placing the arm nearest the animal over and around the animal's head and inserting the thumb into the corner of the animal's mouth. Apply downward pressure on the animal's tongue as you squeeze the jaw between the thumb and four fingers.		
6. Insert the bolus gun into the animal's open mouth, along the side of the mouth and tongue to the base of the tongue.		
7. Gently push the gun back into the animal's mouth and allow the animal to swallow the head of the bolus gun.		
8. Depress the plunger to dispense the bolus and gently remove the gun from the animal's mouth.		

9. Ensure that the animal does not spit the bolus out. If so, repeat the above steps.		

Best practice check 05	Breeding and Stocker Cattle Receiving and Selling Procedures
Objective of this best practice	To ensure that all cattle received are healthy and source verified, and to ensure that all cattle sold have met withdrawal dates and are shipped with complete health records.

5.1 Cattle Receiving	**Yes / No**	**Notes, comments and areas of potential improvement**
1. If possible, obtain previous health histories of all incoming cattle including treatments, implants, and vaccinations.		
2. Record the source, date, and description of cattle.		
3. Inspect and record the health and condition of all incoming cattle.		
5.1A Cattle Processing	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Individually identify all cattle with method of choice.		
2. If necessary, weigh the cattle.		
3. Administer appropriate vaccine, implant, or parasiticide.		

5.1B Handling Sick Cattle	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Check pastures and pens daily for sick cattle.		
2. When a sick animal is located, immediately record the animal's ear tag number, and its location.		
3. Treat the animal accordingly (refer to section 4.2 for treatment procedures).		
4. After treating the animal, identify it distinguishingly (i.e. putting a different coloured treatment tag in the animal's ear). This form of identification designates that the animal has been treated.		
5. Treat the animal accordingly (refer to section 4.2 for treatment procedures).		
6. Record all treatments.		
5.2 Cattle Selling	**Yes / No**	**Notes, comments and areas of potential improvement**
8. Before animals are shipped to slaughter, check to assure that if the animal(s) have been treated, they have met or exceeded label and prescription withdrawal times for all products that have been administered.		
9. If the withdrawal times have been met, remove the treatment tags, and on the		

back side of the tag, record the animal's identification number and the date that the treatment identification was removed.		
10. Keep the cut out treatment tags in a designated bag.		
11. Do not ship animals to slaughter if withdrawal times have not been met.		
12. For animals destined for slaughter, it is recommended that proper personnel initial on the animals' health records that withdrawal times have been met, signifying that the animals are safe for slaughter.		
13. For animals destined for a breeding program or feedlot, inform the purchaser if the cattle have not met withdrawal times.		
14. Provide the purchaser copies of all processing records, feeding records, and health records for all cattle that are sold.		
15. After selling, update the your Cattle Shipping Record.		

Best practice check 06	Feedlot Cattle Receiving and Shipping Procedures
Objective of this best practice	To ensure that all cattle received are healthy and source verified, to ensure that all cattle

	shipped have met withdrawal dates and are shipped with complete health records.

6.1 Cattle Receiving	**Yes / No**	**Notes, comments and areas of potential improvement**
1. If possible, obtain previous health histories of all incoming cattle including treatments, implants, and vaccinations.		
2. Verify that the number of cattle received matches the number on the shipping order.		
3. Inspect and record the health and condition of all incoming cattle.		
4. After receiving, let the cattle rest for a day before processing.		
6.1A Cattle Processing	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Individually identify all cattle with method of choice.		
2. Weigh the cattle.		
3. Administer appropriate vaccine, implant, or parasiticide.		
4. Assign the cattle to a home pen.		
6.1B Handling Sick Cattle	**Yes / No**	**Notes, comments and areas of potential improvement**

1. Check feedlot pens daily for sick cattle.		
2. When a sick animal is located, immediately record the animal's ear tag number, and its pen number.		
3. Treat the animal accordingly (refer to section 4.2 for treatment procedures).		
4. After treating the animal, identify it distinguishingly (i.e. put a different coloured treatment tag in the animal's ear). This form of identification designates that the animal has been treated.		
6.2 Cattle Shipping	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Before animals are shipped to slaughter, check to assure that if the animal(s) have been treated, they have met or exceeded label and prescription withdrawal times for all products that have been administered.		
2. If the withdrawal times have been met, remove the treatment tags, and on the back side of the tag, record the animal's identification number and the date that the treatment identification was removed.		
3. Keep the cut-out treatment tags in a designated bag.		

4. Do not ship animals to slaughter if withdrawal times have not been met.		
5. For animals destined for slaughter, it is recommended that proper personnel initial on the animals' health records that withdrawal times have been met, signifying that the animals are safe for slaughter.		
6. Provide the purchaser copies of all processing records, feeding records, and health records for all cattle that are sold.		
7. Verify that the number of head shipped matches the number on the shipping order.		
8. After selling, update the Cattle Shipping Record		

Best practice check 07	Receiving and Storage of feeds, and Feeding Procedures	
Objective of this best practice	To ensure the proper receiving, storage, handling, and feeding of all feedstuffs (including medicated) and to keep accurate feeding records.	
7.1 Receiving animal feeds	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Do not purchase or feed ruminant-derived protein sources. These include meat and bone meal or any other products produced from ruminant muscle or bone tissue.		

2. When feed or supplements are received, record the source, date, and description of feed.		
3. Inspect incoming feedstuffs on arrival for possible signs of contamination (discoloration, insects, mould, moisture, odour, etc.).		
4. Return any feedstuffs that appear to be contaminated.		
5. Place one label of each kind of feed and supplement purchased in a Feed Labels binder.		
7.2 Storage and rationing animal feeds	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Store all feeds in their designated areas.		
2. Ensure that all bins and silos are labelled properly.		
3. Keep feed storage facilities dry, clean, and free of contaminants (medications, parasiticides, pesticides, herbicides, fertilizer, solvents, rodents, birds, manure, etc.).		
4. Inspect all feed equipment, including scales, mixers, bins, trucks, feed bunks, and feeders regularly.		
5. Clean and repair all feed equipment when necessary to ensure proper functioning and to avoid unsafe feed contamination.		

6. When mixing rations, record the details.		
7. After daily feeding, record the details.		
7.3 Medicated Feed Additive Purchase and Storage	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Purchase only medicated feed additives that are DAFF approved and SABS approved.		
2. When medicated feed additives are received, record the source, amount, date, and description of the medicated feed.		
3. Place one label of each kind of medicated feed additive purchased in the Medicated Feed Additive Labels binder.		
4. Store medicated feed additives separate from all other feeds.		
5. To reduce cross-contamination between medicated and non-medicated feeds:		
a. If possible, use separate handling and feeding equipment. b. If separate equipment cannot be used, produce and feed non-medicated feeds first. c. Flush and/or clean mixing, handling, storage, and feeding equipment by physical means.		

6. Use all medicated feed additives in accordance with the approved label.		
7. Extra label use of feed additives is strictly prohibited.		
8. For all batches of feed produced that contain medicated feed additives, record the additive used, date run, ration name, amount produced, and the earliest date animal(s) could clear withdrawal.		
9. After use of medicated feed additive, record amount used.		
10. After feeding a medicated feed ration, record the details.		

Best practice check 08	Pesticides and Fertilizer Procedures
Objective of this best practice	To ensure the proper storage, handling, and application of pesticides (which include parasiticides, insecticides, herbicides, fungicides, and nematicides) and fertilizers.

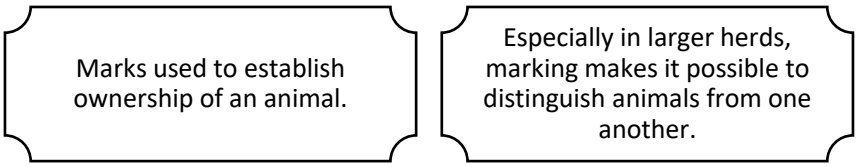
8.1 Receiving and storage of agro-chemicals	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Purchase only pesticides that are approved.		
2. When pesticides are received, update the Pesticide Inventory.		

3. Store all pesticides in designated areas.		
4. Ensure that storage facilities are kept clean, dry, well-ventilated, and locked.		
5. Keep all pesticides away from feedstuffs at all times.		
6. Clean up all spills immediately.		
8.2 Agro-chemical usage and recordkeeping	**Yes / No**	**Notes, comments and areas of potential improvement**
1. Only use parasiticides on animals that are labelled for animal use.		
2. When applying paraciticides to animals, follow label directions.		
3. Before parasiticides are used on animals, record the treatment.		
4. Before pesticide/herbicide use on land, update the Pesticide Inventory.		
5. Store all fertilizer in designated areas.		
6. Ensure that storage facilities are kept clean, dry, well-ventilated, and locked.		
7. Keep all fertilizer away from feedstuffs at all times.		
8. Clean up all spills immediately.		

Learning Unit 7

Treatments Related to Cattle Identification and Securing the Herd

Livestock are marked using assorted marks, in a number of different ways and for various reasons, including:



Animal identification is influenced by a number of factors:

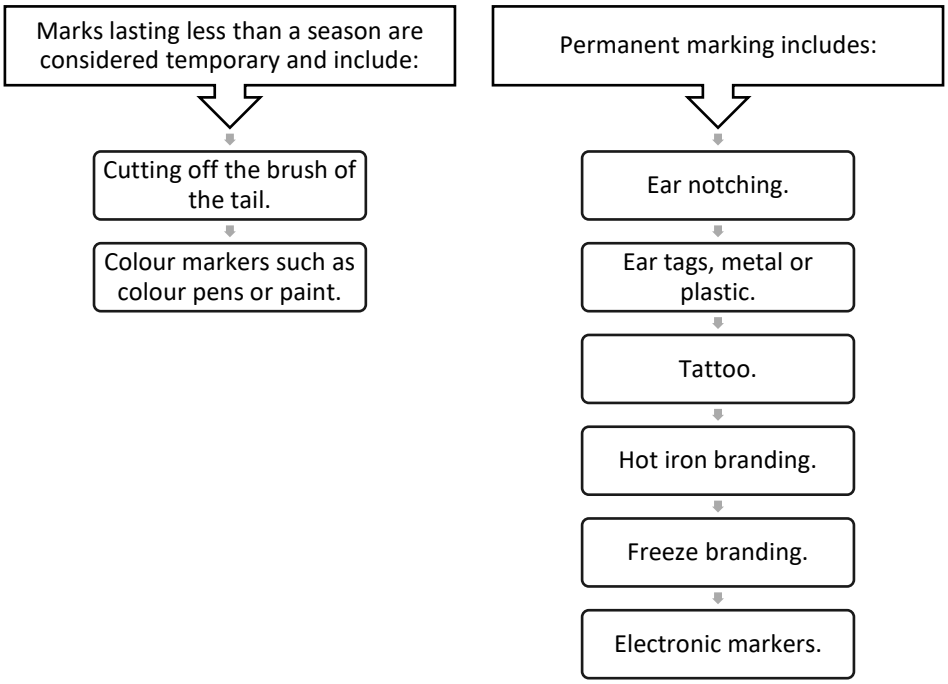
- A farmer's goals have a significant effect on identification. Thus, where a farmer intends to concentrate on commercial beef farming, identification procedures will be very different compared to the situation where a farmer decides to run a stud operation.
- The size of the farming operation as well as the amount of management input available will play a role. On very large farms where there is only one manager and more than one enterprise, much less time can be spent marking animals compared to a small herd where beef is the only enterprise.
- The extent of record keeping, and the use the records are put to, will have an effect.
- The length of time a mark is needed for (how permanent the mark must be) as well as ease of application must be considered.
- Stress to animals and damage that can cause financial losses are important. If identification involves continued pain to animals, the stress will adversely affect production. Damage to hides by brands is known to cause considerable financial losses.
- The availability of the necessary tools for marking must be considered. If metal ear tags are to be used, and these are only available from an overseas country, obvious problems will arise.
- A farmer must decide at what stage of an animal's life the mark must be applied. Thus, branding at a young age requires a smaller brand than when the brand is applied when the animal is fully grown.

When a farmer decides to identify his animals, all these factors must always be considered. The most important factor is what use the mark will be put to. Providing animals with complicated marks that cost a lot of money in terms of management and labour time, as well as production loss in animals, unless it has a financial benefit, is wasteful. The guiding principle must be: if the identification mark is

used practically, mark the animal. If the mark is not used (for example to calculate animal efficiency or to prevent theft), do not waste time and money.

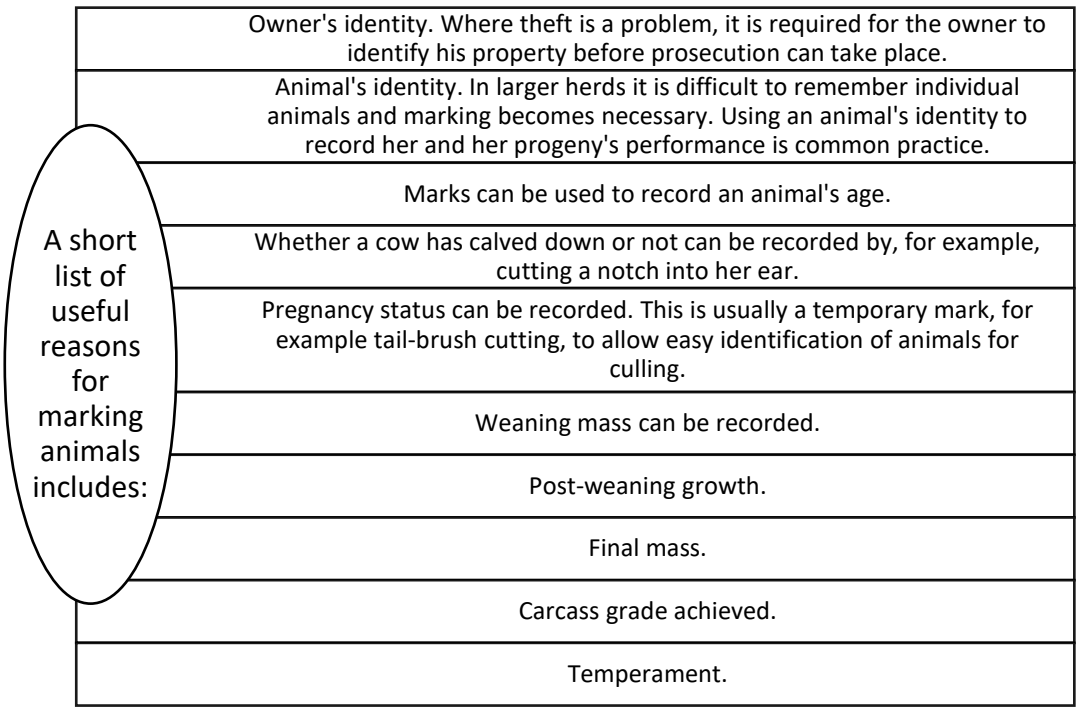
Marking Animals

Marks on animals can be temporary or permanent.



It is noteworthy that with certain breeds of cattle *e.g.* Nguni and Friesland, the colour markings of the animals are as unique as a thumb print. Recording the colour and distribution of colours on an Nguni, either on a drawing or by a photograph, is an effective permanent mark of the relevant animal, albeit a mark which is not as easy to record as is a number.

What to Record in Animal Marking



Methods Of Marking Cattle

It is noteworthy that more than one method of marking an animal can be used. Thus, hot iron branding can be combined with coloured, numbered ear tags. Prior to marking, the side on which the relevant marks will be applied must be decided with care. If a farmer likes to work on the right side of animals and his cattle handling race is designed to work from the right-hand side, marking of animals must be done on the same side.

Branding

Branding is a time-consuming task and, unless theft is a problem, should be confined to animals that are likely to remain in a herd or to stud animals where branding is compulsory. In many parts of South Africa, branding is or will become compulsory by law. The registration of brands with the Registrar of Livestock Improvement is essential to ensure that owners of livestock have a unique right to their own identifying brands.

Whether hot iron branding, freeze branding or chemical cautery (a practice not common in South Africa, which will therefore not be discussed) is used, branding comprises cauterisation of the skin, killing the hair follicles and leaving a scar. Over-cauterisation e.g. holding a hot iron against the skin for too long a time causes the whole skin area around the brand to be damaged, resulting in a smudged brand. This is often the case when a branding iron is too heavy (the iron from which the brand is made

is thick and radiates a lot of heat). On the other hand, a branding iron must not be too sharp where it comes in contact with the animal, this can cause open wounds which could lead to infections and blow fly strike, resulting in illegible brands.

Coat colour and the relevant animal's associated skin colour affect the legibility of a brand. Thus a brand on a dark skinned animal with a light hair colour is often very legible because the resulting scar shows up dark against the light hair or the hair growing on the scar is darker.

An important consideration is that branding irons should be designed in such a way that there are no letters enclosing a whole area of skin e.g. an O should not be a complete circle, but should have at least one, preferably two openings on the O, thus∩. This consideration holds for the letters A, B, D, O, P, Q (should preferably not be used), and R.

Damage to hides is a problem with all types of branding. It is often advised that brands are placed on the neck area or just above the hock or elbow joint. These are difficult sites to brand because animals tend to jump around when branded. A brand on the rump just behind the hip bone, although it damages the hide, is easier to apply and is easily read, especially when animals stand in a tight group. Branding sites where the skin tends to be mobile or folds when an animal moves, causes discomfort to the animal during the healing period.

There is a tendency to use very large brands involving many digits. Apart from damage to hides and discomfort to animals, a great deal of time is wasted applying large brands. Joining digits on the same branding iron is used to try and limit the problem. However, applying a brand with a branding iron with more than two digits is difficult and often unsuccessful.

Hot-iron Branding

Good hot iron brands are permanent and legible from a distance. Poor branding procedures that cause smudging and brands on animals with woolly coats could render hot iron brands less acceptable.

When applying hot iron brands, animals must be dry and the area where the brand is applied must be relatively clean. Moisture or mud on the hair leads to smudged and poor brands. Where the coat is relatively heavy or woolly, the hair can catch alight, leading to smudged brands.

Branding irons must be heated to a dull glow. If uncertain if the irons are hot enough, the heat can be tested on a wooden plank. The animal must be restrained and held very still when the brand is applied. The length of time the brand is applied varies from 3 to 5 seconds, depending on how hot the iron is and the amount of pressure applied. The branding iron must be held firmly because the steam produced often causes the branding iron to slip. With practice, the right amount of heat applied long enough without slipping is usually achieved. If the hair on the branding site is the colour of brown shoe polish and the skin is not broken, the brand has been applied correctly.

After branding, it is best not to apply any medication. Clean water could be applied to cool off the brand area quickly and, if blow fly strike is a problem, a fly repellent used. Should any medication be applied, it must be selected with care because an area with skin damage is prone to absorbing chemical substances rapidly, which could cause problems if toxins are involved.

Freeze Branding

Freeze branding is considered more humane than hot iron branding but is not always as successful as hot iron branding and requires more equipment and time to apply. Keeping animals still during the application of the brand is essential.

The hair is clipped as short as possible over the area where the brand is to be applied. The branding irons, which are of a much more robust design than hot iron brands, are cooled off in liquid nitrogen or dry ice (solid carbon dioxide) with methylated spirit. The amount of time which the branding iron is applied to the skin varies from 28 to 60 seconds. At the shorter time interval, there is de-pigmentation of the hair follicles and at the longer time interval the hair follicles are destroyed.

The hair and related skin colour therefore has a major effect on the application of freeze branding. Thus, applying the branding iron for the short duration to cause de-pigmentation of white hairs on a white skin will result in no visible brand, whereas de-pigmentation of black hair on a white skin is very successful.

Tattooing

Tattoos are made using spiked letters placed in a plier-like instrument. The area where the tattoo is to be applied, usually the ear or an area where a fold of skin can be lifted, is cleaned and pierced. Tattoo paste, liquid or black stove polish is rubbed vigorously into the holes.

Tattoos are very good permanent markers if applied by an experienced person. A black tattoo is however not visible on a black skin. The other problem with tattoos is that an animal must be constrained, and the tattoo area cleaned before the mark can be read.

Plastic Tags

Plastic tags are very commonly used and are legible from a short distance. The problems with plastic tags are that they tend to fall out, lettering can become illegible and dirt can obscure letters. They are often useful when used in conjunction with more permanent markings, such as brands or tattoos, but usually require regular replacement.

Various plastic tags with their associated applicators are available on the market. The best place to apply a plastic tag is between the lower and middle cartilaginous ridge of the ear (there are three horizontal ridges on the inside of the ear of cattle), halfway between the attachment of the ear to the head and the outer edge of the ear.

The surfaces of plastic tags contain chemicals which react with the correct pen to produce lettering. If the incorrect pen is used, or a batch of tags is old or badly scuffed, lettering is apt to disappear rapidly. Furthermore, once lettering on plastic tags become illegible, it is best to replace with a fresh tag rather than to try and write over the faded letters.

Pre-marked tags are available on the market but cost more and these letters are also apt to fade or peel off.

Metal Tags

Self-locking metal tags are reliable and easily applied with the special applicator. They can usually only be read from close up and are less prone than plastic tags to be ripped out.

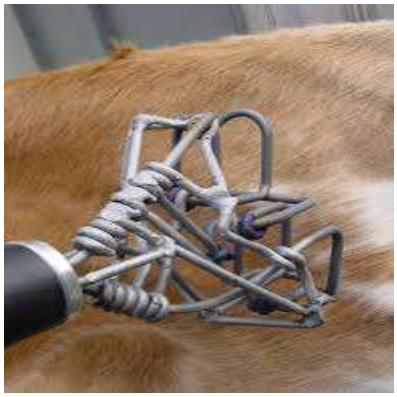
When applying the metal tags, care must be taken to ensure that the sharp point on the one side of the tag locks firmly into the two holes on the opposite side of the tag. Metal tags are applied to the outer edge of the ear, relatively close to the head of the animal and space must be left so that the ear can grow and must not be closed too tightly. Where metal tags are too tight, ticks tend to collect under the tag, causing abscesses.

Ear Notching

Ear notching is a permanent means of animal numbering that can be used in many ways, but is disliked by many farmers because ears tend to tear, making reading of notches difficult and the disfigurement

caused to animals. Although herders rapidly learn to read notches, misreading of notches is common, especially when the hair on the ears is long. Numbers are notched. Notching can be used in other ways, for example, if branding is the identification method of choice, a cow that skips a breeding season is marked with a notch on the tip of an ear.

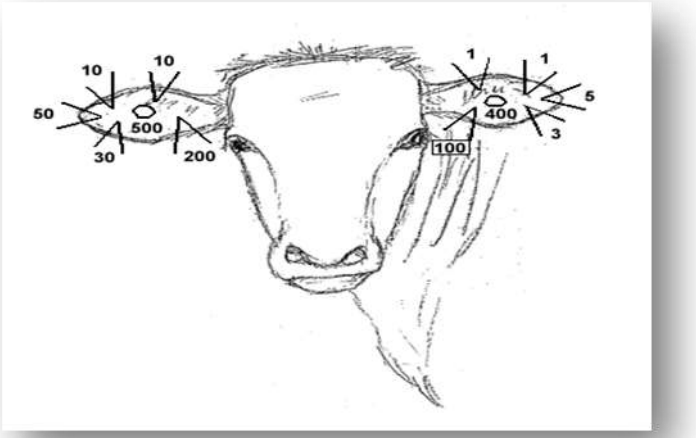
Electronic Markers



Electronic markers are available whereby a small micro-chip is implanted at a convenient site *e.g.* next to the tail head or in the thick neck muscles. An instrument which must be pointed at the implant site from a relatively short distance is used to read the signalled identity number of the animal emanating from the microchip. Where this system is available it is very useful, but microchips can become faulty.

DNA Finger Printing

With modern technology, the genetic make-up of an animal can be recorded as an electrophoretic image. In cattle, these images are unique and can be used to identify animals by sending a sample of blood or other appropriate tissue to a laboratory with the required equipment. Although not a technique which can be used for routine identification, it can be used for example where an animal is slaughtered and the thieves leave the animal's skin behind, taking only some or all of the meat. With DNA fingerprinting the relevant meat can be identified as belonging to the skin and its identifying brand.



System for numbering livestock using ear notching and holes.

Learning Unit 8

Medical Treatments

Sick or Diseased Animals

In order to make decisions about administering treatments such as vaccines or physical interventions, it is necessary to think carefully about the possible effect that the treatment might have on a diseased animal. It is very important to know what signs to look for in order to ensure that animals that are not entirely healthy are not treated with unnecessary preventive health vaccines. In some cases the treatments that are administered may even be a veterinary response to ensure that the animal is treated for disease.

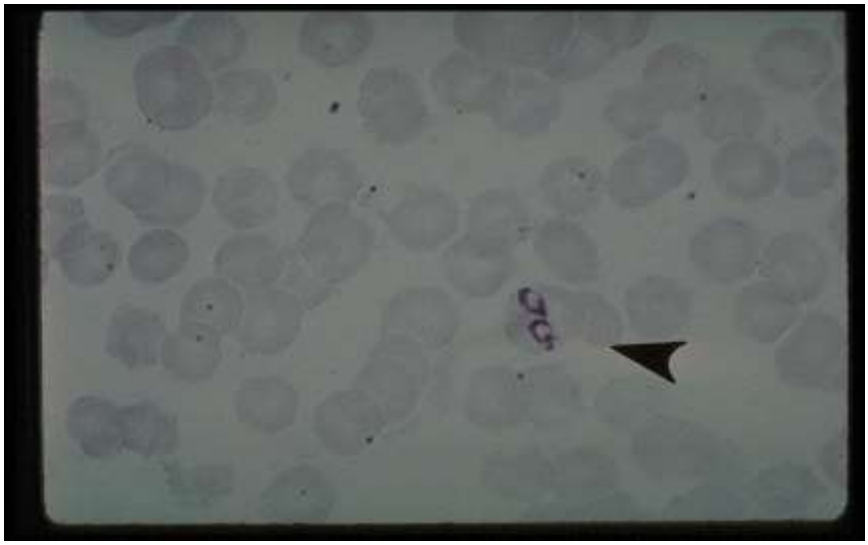
In order to understand what causes disease in animals, we first need to know what disease is. Disease (also known as sickness) is any process that interferes with the way the different parts of the body work and look. We do not normally consider injuries such as broken legs and cuts as diseases.

There are many causes of disease in animals. Knowledge of what causes disease, and of how animals can get a disease, helps us to know how to prevent disease and to treat sick animals. The handout below cover some of the common illnesses that are found in livestock.

Common Diseases In Livestock

There are many causes of disease in animals. Knowledge of what causes disease, and of how animals can get a disease, helps us to know how to prevent disease and to treat sick animals.

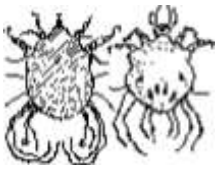
Parasites



Parasites are organisms that have to live on or in other organisms, such as animals, in order to survive. Most parasites are easy to see, although some mites and the early stages of worms can only be seen under a microscope.

External Parasites

Mites Flies, lice, fleas, ticks and mites can cause serious diseases in animals.



Some live on the animals for their entire lives, others only spend part of their lives there, while others only visit to feed.

They can result in irritation and skin damage in animals. Some parasites can also pass diseases such as Red water and three- day Stiff sickness between animals.

Internal Parasites

Internal parasites (including roundworms, flukes and tapeworms) can cause serious diseases and loss of production in animals.

They usually live in the stomach and intestines but also in other parts of the body such as the lungs and liver.

Microbes (germs)

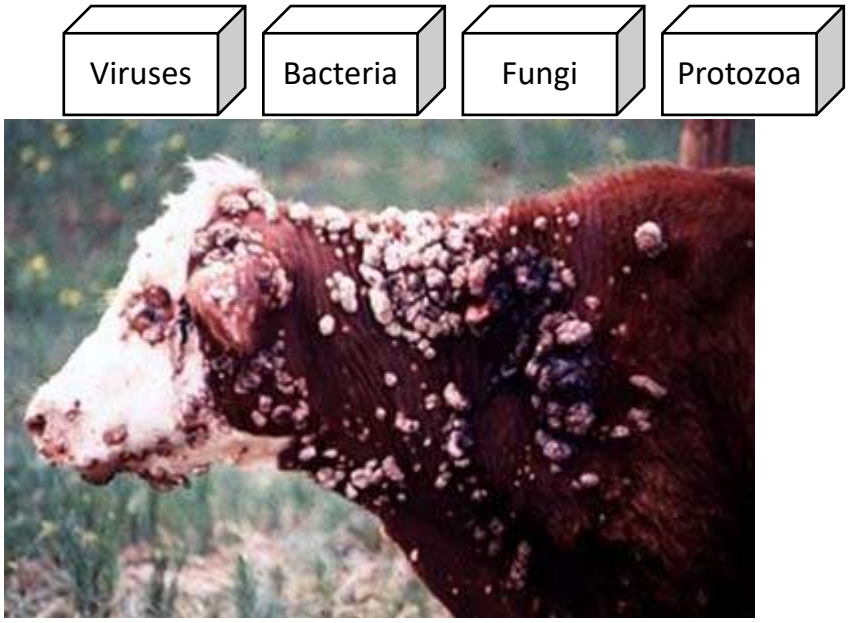
Microbes (germs) are usually too small to be seen with the naked eye and only a microscope will enable you to see what a microbe looks like.

Just because you do not see microbes with your naked eye, does not mean that they cannot cause disease in your animals.

Some microbes are harmless. For example, bacteria surround animals and people, and they even live on our skin and inside our nose, mouth and stomach, but these bacteria do not normally cause problems. Some microbes are even helpful, such as the ones in our gut which help us to digest food.

Many different microbes can cause disease in animals, but there are four main types:

Viruses



Viruses are the smallest of all microbes.

They must live inside cells in order to survive and breed.

Viruses cause about 60 % of disease outbreaks in animals and humans.

Examples of diseases in animals caused by viruses are rabies, Newcastle disease and three-day Stiff sickness.

It is difficult to treat diseases caused by viruses because the viruses live inside animal cells.

Therefore, any medicine that can kill the viruses will also harm the animals in which the viruses are present.

Bacteria

Bacteria can live in animals and in the environment. Not all bacteria cause disease.

People and animals have bacteria living on and in them that do not cause disease.

Examples of diseases in animals caused by bacteria are anthrax, Black quarter and tuberculosis. Bacteria can infect wounds, and that is why wounds should be treated.

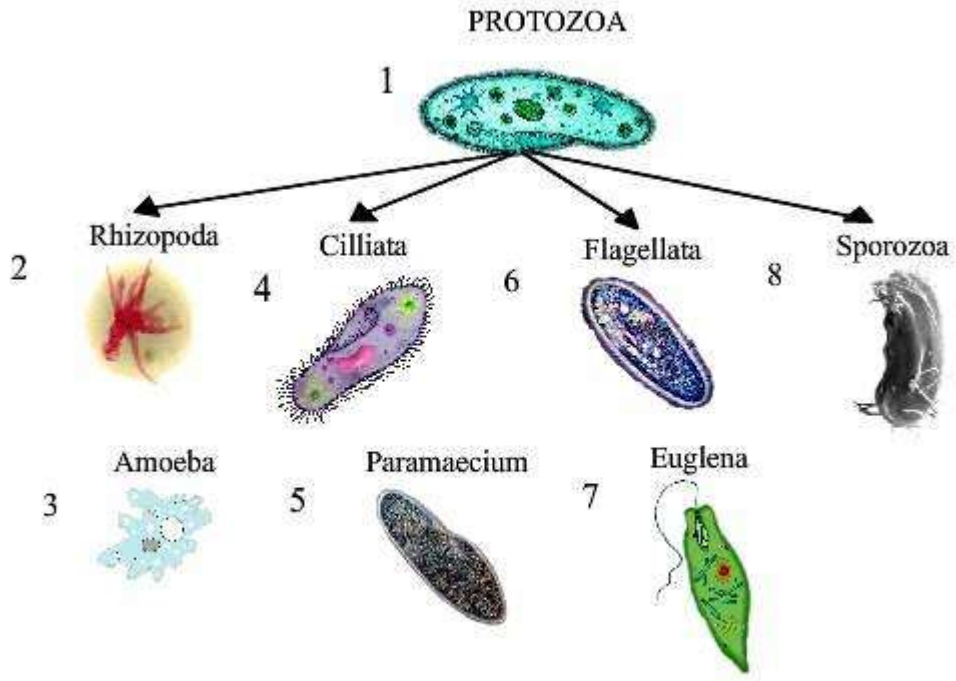
Fungi

Fungi occur widespread in the environment (soil, air and water) and include mould on stale food and mushrooms. Fungi need to grow on organic material in order to feed, and this can include animals and people.

An example of a fungal disease in animals is ringworm.

Some fungi are normally harmless, but can cause disease in some situations, especially after prolonged use of antibiotics. Some fungi can also produce toxins or poisons which can be a problem when food becomes stale or wet.

Protozoa



Some protozoa can live outside cells, especially the type that causes trichomonosis, a venereal disease in cattle. Others need to live inside cells, and include those causing coccidiosis, Redwater, Heart water and gall sickness.

Animals can be poisoned by chemicals (such as insecticides and dips), poisonous plants and fungal toxins.

They can also be poisoned when bitten by snakes, scorpions and spiders.

Poisoning

Animals can be poisoned by chemicals (such as insecticides and dips), poisonous plants and fungal toxins.

They can also be bitten by snakes, scorpions and spiders.

Dietary Problems

Lack of enough food or lack of a particular part of the food (such as phosphorus) can also cause disease.

Malnourished animals may develop other diseases because they are weak.

Metabolic Diseases

Metabolic diseases are an upset in the normal functioning of the animal (that is not caused by infection, poisoning or feed deficiencies) and usually result from intensive animal production.

An example is milk fever in highly-productive dairy cows.

Congenital Diseases

In some cases, animals can be born with a disease. Some of these may be inherited (passed on from the parents). This is rare, and inherited diseases are usually seen at birth. An example is congenital hydrocephalus, which is a swelling of the brain caused by fluid and can be clearly seen as a swelling of the head.

Environmental Diseases

Environmental problems, such as littering, contribute to some diseases, for example, animals may eat plastic bags or wires, and this can harm the animal's health.

Cancer

Cancer occurs when some of the cells in the body grow in a way that is different from normal. Illness occurs because of the pressure of the growth on other parts of the body and the fact that affected parts of the body cannot function normally.

Cancer can also cause signs such as fever and loss of condition.

In some instances, viruses can cause cancer.

Allergies

Some diseases are caused by allergies, which is when the body's own immune system attacks part of the body.

Degenerative Disease

Some diseases are caused by parts of the body breaking down, particularly as an animal becomes older.

How to Prevent Diseases

Good management, which includes good hygiene and sufficient feed, can reduce the chances of animals getting disease.

In some cases, vaccination and practices such as dipping and de-worming can also prevent disease.

Vaccination

The basic principle of vaccination is that a disease-causing agent is given to an animal in a killed or weakened form (or in the form of proteins genetically engineered to look like a disease-causing agent), in order to stimulate the production of antibodies to fight off the disease.

Why do we vaccinate cattle? Of course, the reason is to attempt to prevent disease. However, if our timing is wrong, we can actually make the conditions worse.

Vaccination isn't the same as immunization. When we vaccinate, we hope that immunization occurs — but this isn't always the case. In order to have good immunity, the calf must be able to respond to vaccination. This simple premise is often overlooked because we tend to take immunity for granted.

There are several reasons that vaccinations may not result in immunity, but the most common is probably stress- related. Novelty is one of the greatest stressors of livestock. I'm quite certain that many of the high-risk calves we see in our practice have had a tremendous dose of novelty by the time they arrive at the feed yard — weaning, auction markets, order buyer's facilities, livestock trailers, etc. Then we stack the physical stressors such as shrink, inclement weather and lack of rest on top.

These stressors cause the release of a host of hormones that will hamper the immune response. Cortisol is possibly the most important of these hormones. It's so effective in shutting down the immune system, it's commonly used to control hyper immune reactions (allergic reactions) in people.

In order for the stressed calf to respond to vaccination, we must allow the calf time to recover from his stress episode. We encourage our clients to wait at least 12 hours after arrival before processing. In two extreme situations, I've waited as long as two days after arrival before processing.

Vaccinating cattle while they're still under stress is kind of like swinging the bat before the pitcher releases the ball. It's simply going through the motion. We can say the job is done, but we can't say it was done well or done right.

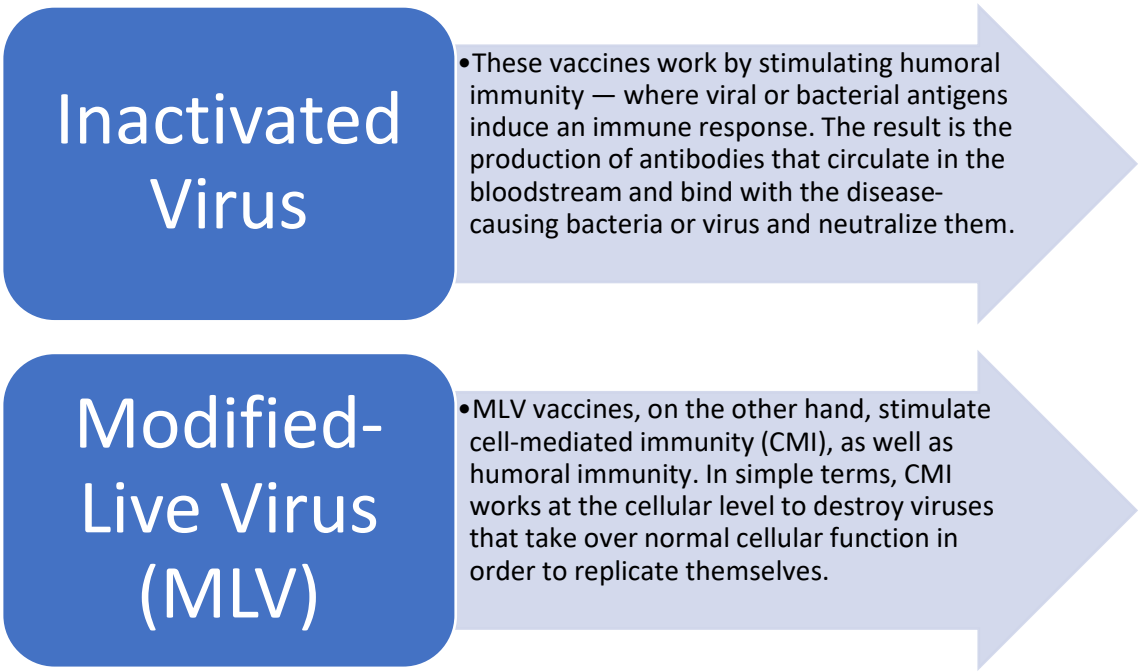
If the job is to be done well, we must apply the principles of good animal husbandry: clean water, high quality feed, a comfortable place to rest and time to rest. If these are provided, the calf will be able to clear these excessive stress-related hormones from the bloodstream. Once this occurs, the calf will have a greater chance of responding to the vaccines and should actually become immunized.

Immunity isn't automatic. It shouldn't be taken for granted that just because we administered a vaccine to an animal, it is immunized. We have to give the calf the best opportunity we can to develop immunity.

Types Of Vaccines

When you look at the vaccines available for a particular disease, it's tempting to view them as equal, but there may be vast differences in what they actually do or are designed to do.

Many producers are well versed in the trade-offs between using killed (inactivated) and modified-live virus (MLV) vaccines.



Depending on how a particular disease organism works, killed vaccines may be sufficient. In other cases, MLV vaccines may be required to offer adequate protection. Hollis says a classic example is infectious bovine rhinotracheitis (IBR). Managing the disease requires CMI attacking and killing the virus within the cells; humoral immune response isn't effective by itself.

But even vaccines of the same type can provide different levels of protection. In fact, vaccine labels describe the level of protection.

Understanding Vaccine Labels

Vaccines are an essential tool for aiding in the prevention and control of infectious diseases in cattle. There are 100's of vaccines and vaccine combinations available for cattle producers. Selecting and using the right vaccines is an essential part of any successful cattle operation.

With all the choices available, it's important to understand the labelling guidelines.

There are 5 possible levels of protection:

- Prevention of infection.
- Prevention of disease.
- Aid in disease prevention.
- Aid in disease control.
- Other claims.

In each instance, data generated by the vaccine manufacturer must fully support label indications and accurately reflect the expected performance of the product.

In deciding on a vaccine program for your cattle, consult with a veterinarian, who can help you choose the most effective products and develop the best program for your operation. We also encourage you to read vaccine labels and become knowledgeable on what they are indicated for and what their limits are.

Prevention of Infection

Approved for products able to prevent all colonization or replication of the challenge organism in vaccinated and challenged animals. If such a conclusion is supported with a very high degree of confidence by convincing data, a label statement such as, "for the prevention of infection with (specific microorganism)," may be used.

Prevention of Disease

Allowed only for products shown to be highly effective in preventing clinical disease in vaccinated and challenged animals. The entire interval (95%) estimate of efficacy must be at least 80%. If so, a label statement such as, "for the prevention of disease due to (specific microorganism)," may be used.

Aid in Disease Prevention

Allowed on products shown to prevent disease in vaccinated and challenged animals by a clinically significant amount that may be less than required to support a claim of disease prevention (see above). If so, a label statement such as, "as an aid in the prevention of disease due to (specific microorganism)," may be used.

Aid in Disease Control

Claim exclusive to products shown to alleviate disease severity, reduce disease duration or delay disease onset. If so, a label statement such as, "as an aid in the control of disease due to (specific microorganism)," or a similar one stating the product's particular action, may be used.

Other Claims

Products with beneficial effects other than direct disease control, such as the control of infectiousness through the reduction of pathogen shedding, may make such claims if the size of the effect is clinically significant and well-supported by the data.

A label is the information printed on the outside of the vaccine bottle. This same information is also on a printed piece of paper that comes in the box containing the bottle. The label contains instructions for administering the vaccines and other key information.

The three most important sections of the label are "indications," "directions" and "precautions."

Example:

Let's examine what each of those sections is about, using Vira Shield® 6 as an example. Vira Shield 6 is a vaccine that prevents several respiratory and reproductive diseases in cattle.

Indications—This section tells you what disease or diseases the vaccine prevents and what types of cows should receive the vaccine.

INDICATIONS: For use in healthy cattle, including pregnant cows and heifers, as an aid in the prevention of disease caused by infectious bovine rhinotracheitis (IBR), bovine virus diarrhoea (BVD Type 1 and BVD Type 2), parainfluenza Type 3 (PI3), and bovine respiratory syncytial (BRSV) viruses. Produced from non-cytopathic (BVD Type 1 and BVD Type 2) and cytopathic (BVD Type 1) isolates.

Directions—This section explains how to give the vaccine to the cow, including the quantity or volume of vaccine a cow should receive. The two most common routes of vaccine administration are intramuscular, which means injecting directly into the muscle, and subcutaneous, which means injecting just under the skin.

DIRECTIONS: Shake well before using. Administer 5 mL subcutaneously. In accordance with Beef Quality Assurance guidelines, this product should be administered subcutaneously (under the skin) in the neck. Revaccinate in 4-5 weeks. Vaccinate dairy cows at dry-off. Revaccinate annually or as recommended by your veterinarian.

Precautions—This section includes warnings and safety information about storage, handling and any types of cows that should not be given this vaccine due to safety reasons. Pay close attention to this section. If the vaccine is not safe for certain types of cows – like pregnant cows or young calves – that information will be included in this section. Vira Shield is safe for all cows and calves, so there are no such warnings on its label.

PRECAUTIONS: Store out of direct sunlight at 2°-7°C (35°-45°F). DO NOT FREEZE. Use entire contents when first opened. Do not vaccinate within 60 days prior to slaughter. Transient swelling may occur at the site of injection. Anaphylactic reactions may occur. Symptomatic treatment: Epinephrine. Contains amphotericin B, gentamicin, and thimerosal as preservatives.

Vaccine Expiration

All vaccines and diluents have expiration dates. The expiration date is the date by which the vaccine or diluents should be used. Vaccine and diluents should not be used after this date has passed. When the expiration date is marked with only a month and year, the vaccine or diluents may be used up to and including the last day of the month indicated on the vial. Any unused vaccine or diluents should not be used after this month has passed.

Multidose premixed vaccine vials contain bacteriostatic agents that prevent the growth of bacteria. These vaccines can be used until the date of expiration printed on the vial unless they become contaminated.

Single-dose vials are meant for one-time use only. Once the protective caps on single-dose vials have been unsealed, it may not be possible to determine if the rubber seals have been punctured. Therefore, do not open single-dose vials until you are ready to use them.

Expired vaccine and diluents should never be administered. Promptly remove expired vaccine from the refrigerator or freezer to avoid accidental use.

Administering Treatments When Abnormal Behaviour Occur

What it means if cattle are lethargic

Lethargic behaviour in cattle can be symptoms of disease or heat stress. Be alert to it and react quickly. It is important to establish what is wrong with the animal as soon as possible.

Dealing with Aggressive Cattle

Aggression is often a natural state of bulls, especially if cows are on heat, but aggression is also seen if animals are in pain or discomfort. Aggression is a known symptom of BSE (Mad Cow Disease)-BSE has never been diagnosed in South Africa.

Cattle with a Lack Of Appetite

A lack of appetite can also indicate that something is wrong with the animal. It is recommended that you keep an eye on animals with a lack of appetite and if it persists, to report it and call for help.

Treatment to Pregnant Cows And How To Avoid Abortion

Abortion in dairy cattle is commonly defined as a loss of the foetus between the age of 42 days and approximately 260 days. Pregnancies lost before 42 days are usually referred to as early embryonic deaths, whereas a calf that is born dead between 260 days and full term is defined a stillbirth. A low rate of abortions is usually observed on farms and 3 to 5 abortions per 100 pregnancies per year is often considered "normal." However, the loss of any pregnancy can represent a significant loss of (potential) income to the producer and appropriate action should therefore be taken to prevent abortions and to investigate the cause of abortions that may occur.

Common Causes of Abortion

While infectious agents are perhaps the most frequently thought of cause of bovine abortion, there are other factors which may cause a proportion of pregnancies to terminate with an abortion.

Genetic abnormalities in the foetus that may result in abortion are not very frequently diagnosed, and these usually occur as an individual cow problem rather than as a herd outbreak. These abnormalities, which may not cause a change in the outward appearance of the foetus, may result in abortion because of the growing fetus' inability to develop properly in the uterus. Genetic abnormalities may also cause obvious physical changes in the foetus, just as other infectious agents may (see below).

Heat stress can affect reproductive performance in a dairy herd, although it will generally cause conception problems rather than abortions. While there is some evidence to suggest that a very sudden increase in environmental temperature may result in abortions, there is little evidence to support heat stress as a common cause of abortions. Similarly, on rare occasions a cow that develops a very high fever due to an infection may abort her foetus.

Toxic agents may also cause abortions or early embryonic deaths. Cattle are susceptible to fertilizer nitrites and nitrates or the nitrates found in plants under certain conditions (e.g. drought-stress). If a cow is exposed to sufficiently high levels of nitrates/nitrites (~.55 % or greater nitrate in forage), abortions may occur, especially in late gestation.

Some experimental studies have shown that mycotoxins such as zearalenone in very high levels can cause abortions in cattle, although these levels are not normally found in "naturally contaminated" feedstuffs. Likewise, the only reports of abortions associated with aflatoxin appear to be situations where the health of the cow was also severely compromised by the toxin.

Ergot alkaloids are toxins produced by the Claviceps fungus, which grows in the seeds of various grasses and small grains such as fescue, brome grass, wheat, oat and rye. These toxins have been associated with abortions in dairy cattle as well as other health problems.

Although the cause of many abortions is never determined, infectious agents represent the most commonly diagnosed cause of abortions in many laboratories.

POE Activity 9

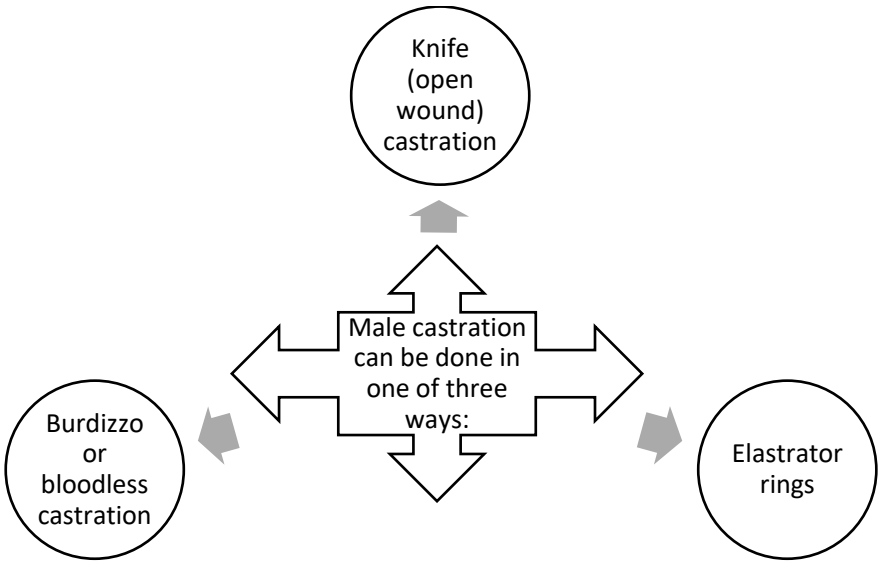
POE Activity 10

POE Activity 11

Learning Unit 9

Treatment: Castration

Castration Tools



Knife Castration

Knife castration is the only completely safe method to sterilise male animals and can be done at any age, although with older animals the task is best left to a qualified veterinarian. With this method of castration there is always a danger that the wound can become infected and the necessary precautions must be taken.

With young animals, the lower part of the scrotal sack is cut off and each testicle removed by cutting the membrane enclosing the testicle and the relevant testicle is extruded. The spermatic cord and arteries are cut off using a scraping action to inhibit bleeding. Tying off the spermatic arteries can also be used to prevent excessive bleeding.

Elastrator Rings

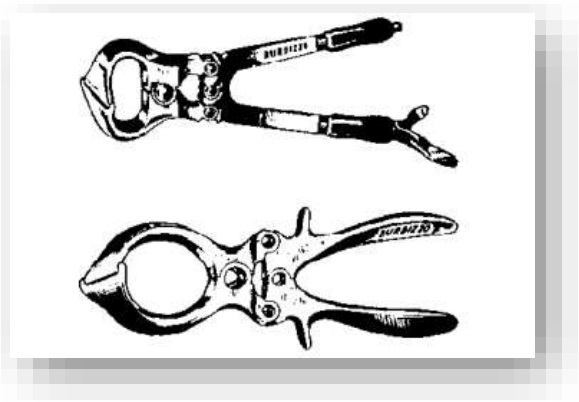
Elastrator rings were developed to castrate sheep and have subsequently come into use to castrate bull calves. A rubber ring, the elastrator ring, is applied around the neck of the scrotal sack using the special instrument designed for this purpose. The testicles must be in the scrotal sack distal (away from the body of the calf) to the elastrator ring. After a while the testicles and that part of the scrotal sack distal to the elastrator ring degenerates and falls off.

Where fat deposition is not desired, but the farmer wants the higher growth rates associated with intact males, short scrotum castration can be done. The testicles are pushed up against the body of the bull and the elastrator ring applied to the scrotum distal (away from the body) to the testicles but in a manner that will keep the testicles firmly in contact with the body. Such a bull is sterile, grows well and fat deposition is the same as with intact males.

Many veterinarians believe that the use of elastrator rings in cattle is inhumane. To minimize pain when using the rubber ring method of castration, they must be applied within three days of birth, which can be a problem because in some calves the testicles remain in the body cavity for a time post-partum.

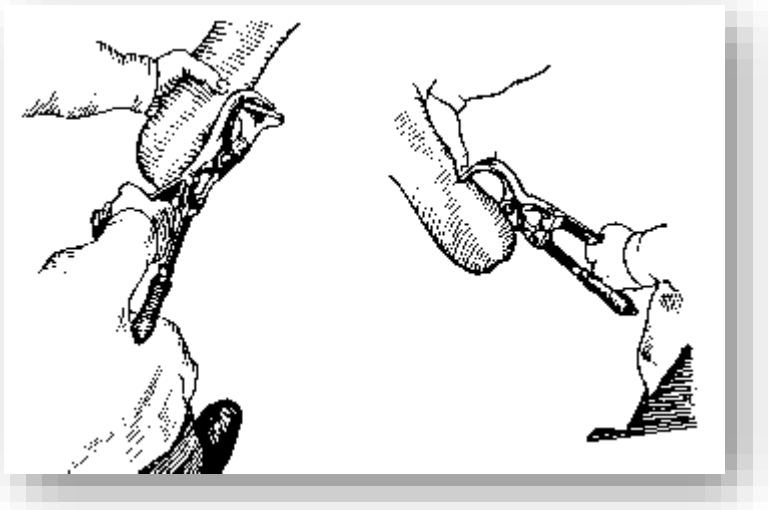
Burdizzo

The burdizzo is an instrument used to cut off the blood supply to the testicles, causing cell death of the testicular tissues resulting in degeneration of the testicles. The best time to apply the burdizzo is as soon as the spermatic cords can be felt, which three to four weeks after birth is. In older animals the burdizzo does not work well because the connective tissue in the spermatic cord thickens with age, preventing the instrument from performing its task. Bulls older than 4 months become increasingly difficult to burdizzo as they get older.



Cattle burdizzo (top) and sheep burdizzo (bottom; not drawn to scale). When storing burdizzo's it is best to leave the jaws open in order to prevent wear on the edges of the jaws.

The burdizzo is applied to each spermatic cord separately in such a way that the blood supply to the testicles is damaged, while circulation to the scrotal sack remains intact. Gangrene can set in where blood circulation to the scrotum is lost. To achieve these objectives, the burdizzo is applied to the individual spermatic cords at opposite sides of the scrotum, leaving a central area free for blood to circulate or applying the burdizzo at different levels on opposite sides of the scrotum.



Applying the burdizzo to one spermatic cord at a time.

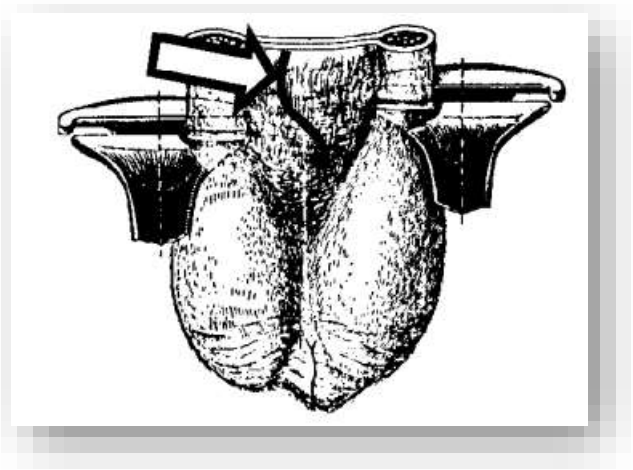


Illustration to show how the burdizzo is applied to opposite sides of the scrotal sack at different levels, leaving a space between the pinched areas, in order to preserve the circulation (arrowed line) to the lower part of the scrotum.

Castration with a burdizzo is best performed by two persons. The calf is first immobilized (e.g. tying it with ropes) or placed in a crush with a thick pole behind its hocks to prevent it from kicking. Holding an animal's tail firmly in a vertical position is very effective in preventing it from kicking, which requires a third handler. One handler holds the burdizzo and opens its jaws. The second handler guides the burdizzo, first moving a spermatic cord to the side of the scrotal sack, after which the relevant cord is hooked over the tooth at the side of the one jaw of the burdizzo. The first handler is then instructed to close the jaws slowly, while the second handler ensures that the spermatic cord does not slip out from between the jaws. Once the burdizzo is closed to the point where the spermatic cord can no longer slip out, the first handler closes it with an even, firm motion. Slamming the jaws shut must be avoided to prevent tearing the skin. The burdizzo is left closed for five to six seconds. The second cord is then nipped on the opposite side of the scrotal sack using the same technique. Cutting off the blood supply to the testicles causes ischemia (loss of oxygen to a body part), causing death of the testicular tissues. With successful castration, on the day after castration, the testicles are swollen. Over a period of weeks, the testicles shrivel up and are replaced with connective - and fat-tissue.

Part 3

Animal Behaviour and the Correct Handling Procedures and Facilities

In this part we explore the following concepts:

- Understanding animal behaviour
- Correct handling procedures of animals
- Handling facilities and equipment
- General flight zone of an animal
- Handler's movement pattern
- Flow of cattle through the gate
- Abnormal behaviour in animals
- Responding to defensive behaviour
- Risks when working with animals

Learning Unit 10

Understanding Animal Behaviour so as to Handle them Correctly

Introduction

Most domesticated animals will normally be no threat or danger to the person that handles them. When handled inappropriately, some animals will tend to behave defensively and pose a threat or danger to its handler.

As it is impossible to expect any one learner to know everything about all animals and their behaviour, this module will allow learners to select the specie(s) (types of animals) of their choice and concentrate on them, however some general principles in handling animals need to be upheld. This material will therefore only cover the generic aspects of animal behaviour. As a learner you will be encouraged to bring any specialized knowledge you have acquired to the classroom to share with other learners**.**

Cattle Behaviour And How It Influences Handling

It is very important that you understand that animals such as beef cattle that are normally kept on extensive grazing (open grazing) veldt are not as tame as dairy cows. You must therefore be careful when you approach such animals in the field especially when they have young calves.

Herdsmen need to respect the animal's territory and be careful when approaching them. Your presence can be the reason why the animal becomes defensive. Like humans, animals have a personal space within which they will become uncomfortable when approached. Experienced herdsmen know how to keep a critical distance/flight zone during herding and handling

The flight Zone

This is the area or space surrounding the animal or group of animals. When a person enters this zone, the animal will move away until it feels safe. If the person retreats, the animal usually stops moving away.

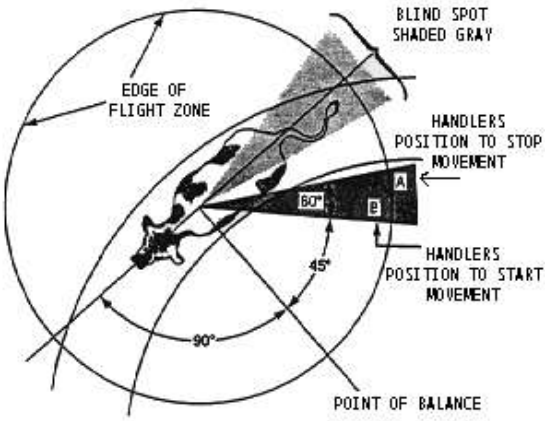


Figure This diagram illustrates the general flight zone of an animal. The actual flight zone of an individual animal will vary depending on how "tame" the animal is. An animal's flight zone will vary depending on how calm it is. The flight zone gets bigger when an animal becomes excited. The flight zone is also bigger when you approach "head on". Calm cattle are easier to move. If cattle become excited, it takes 20 to 30 minutes for them to calm back down.

Different animals have different flight zones. Tame animals have a much smaller flight zone than wild animals.

The size of the flight zone changes due to:					
The handler's angel of approach	The speed of the handler's approach	The animal's familiarity with the handler	Sound or visual contact with the handler	Wildness/Tameness of the animal	Recent experiences of the animal

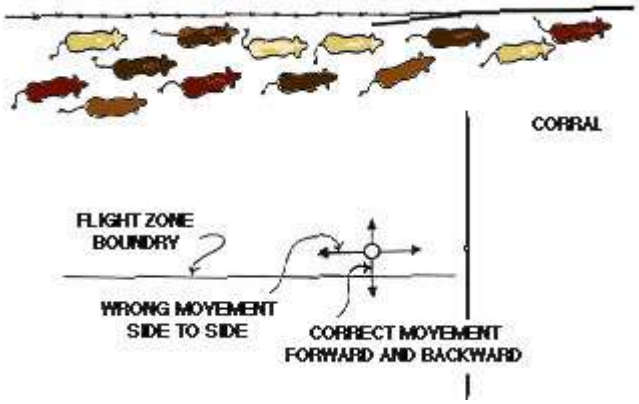
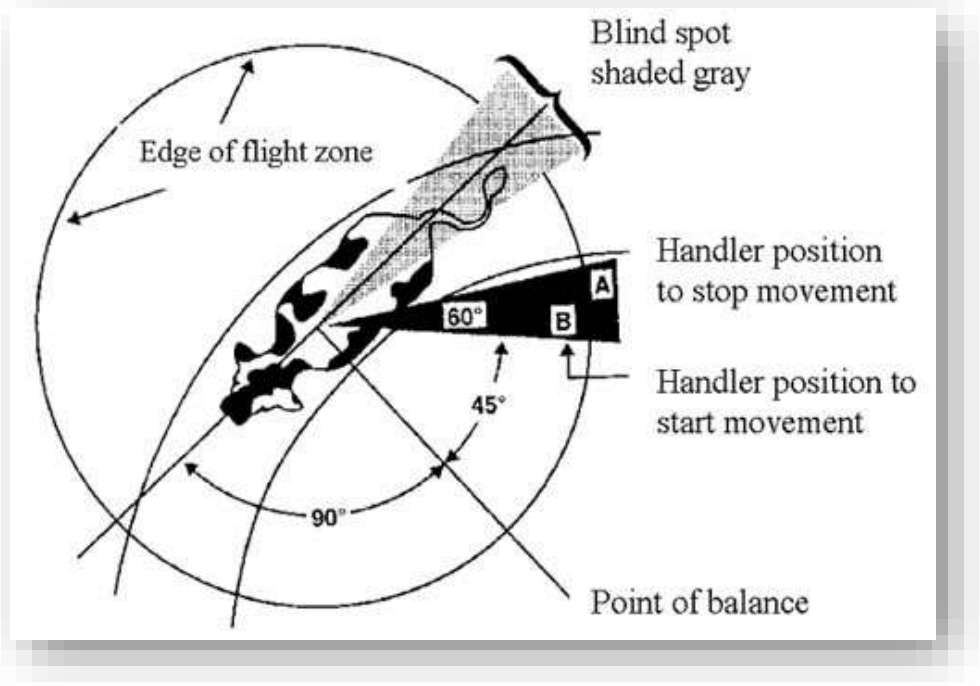


Figure above Using the principles of flight zone behaviour, a handler is able to move cattle into a pen in a calm and orderly way. Using the positions shown on this diagram will enable the handler to

control the flow of cattle through the gate. Cattle movement can be slowed or speeded up by moving forward or backward.

Point of Balance:



To keep animals, calm and move them easily, the handler should work on the edge of the flight zone. He penetrates the flight zone to make the animals move and he backs up if he wants them to stop moving. The best positions are shown on the diagram. The handler should avoid the blind spot behind the animal's rear. Deep penetration of the flight zone should be avoided. Animals become upset when a person is inside their personal space and they are unable to move away. If cattle turn back and run past the handler while they are being driven down a drive alley in the stockyard, overly deep penetration of the flight zone is a likely cause. The animals turn back in an attempt to get away from the handler. IF the animals start to turn back, the handler should back up and increase the distance between himself and the animals. Backing up must be done at the first indication of a turn back. If a group of animal's balk at a smell or a shadow up ahead, be patient and wait for the leader to cross the shadow. The rest of the animals will follow. If cattle rear up in a loading chute, back away from them. Do not touch them or hit them. They are rearing in an attempt to increase the distance between themselves and the handler. They will usually settle down if you leave them alone.

The point of balance is at the animal's shoulder. Cattle will move forward if the handler stands behind the point of balance. They will back up if the handler stands in front of the point of balance. Many handlers make the mistake of standing in front of the point of balance while attempting to make an animal move forward in a chute. Groups of cattle in a chute will often move forward without prodding

when the handler walks past the point of balance in the opposite direction of each animal in the chute. It is not necessary to prod every animal. If the animals are moving through the chute by themselves, leave them alone.

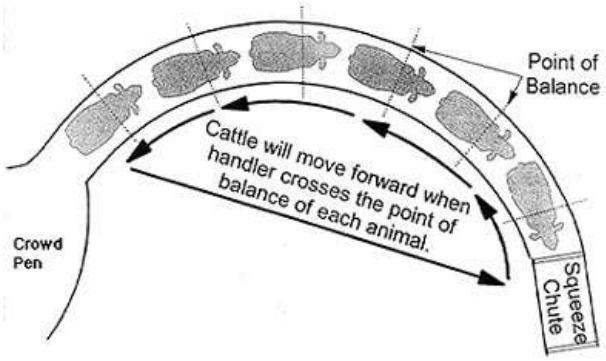


Figure Handler's movement pattern to keep cattle moving into the squeeze chute in a curved chute system.

When a herd is moving, social rank can determine an animal's position within the herd. Animals with high social rank seldom lead. Being a leader is a more dangerous position, so animals with high social rank lag behind or remain in the safety of the middle of the herd.

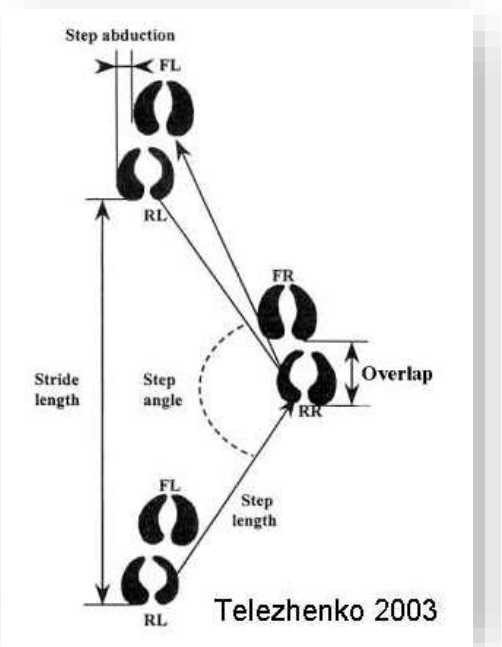
The first principle of animal handling is to avoid getting the animal excited. It takes up to 30 minutes for an animal to calm down and its heart rate to return to be normal after rough handling. Calm animals move more easily and are less likely to bunch and be difficult to remove from a pen. Handlers should move with slow, deliberate movements and refrain from yelling.

Animals may become agitated when they are isolated from others. If an isolated animal becomes agitated, other animals should be put in with it. Electric prodders (prods) should be used as little as possible or only on stubborn animals. However, it is more humane and causes less damage to give an animal a mild electric shock than to hit it with a stick or twist its tail.

Instead of prods, other droving aids should be used such as flat straps, rolled-up plastic or newspaper, sticks with flags. Hesitant animals can often be enticed into pens or vehicles by first leading in a tame animal and the others will follow.

How Cattle Walk

How cattle walk and how it may influence the design of crush and housing facilities to avoid injury and stress.



Cattle walk with their heads nodding in some form of rhythm with their footsteps. Cattle (unlike dogs, cats and humans. i.e. predatory animals) have their eyes on the sides of their heads instead of facing front, and the head movement may assist with depth perception by continuously changing perspective.

A healthy cow walking on pasture places the rear foot into the position vacated by the front foot on the same side. On slippery floors or in dark conditions that alter a cow's confidence, she places her rear foot outside the track of the front foot, alters stride and step length, and walking speed. This altered walking behaviour provides greater stability but places greater stress on the outside claw.

The Feeding Behaviour Of Cattle And How It May Influence Administering Of Medical Diets

Ruminants such as cattle, sheep and goats are herbivores with a unique digestive anatomy. A prominent feature of ruminant dental anatomy is that they lack upper incisors, having instead a "dental pad", as shown in the image to the right of a goat.

The Mating Behaviour Of Cattle How It May Influence Decisions About Treatments Such As Dehorning And Castration

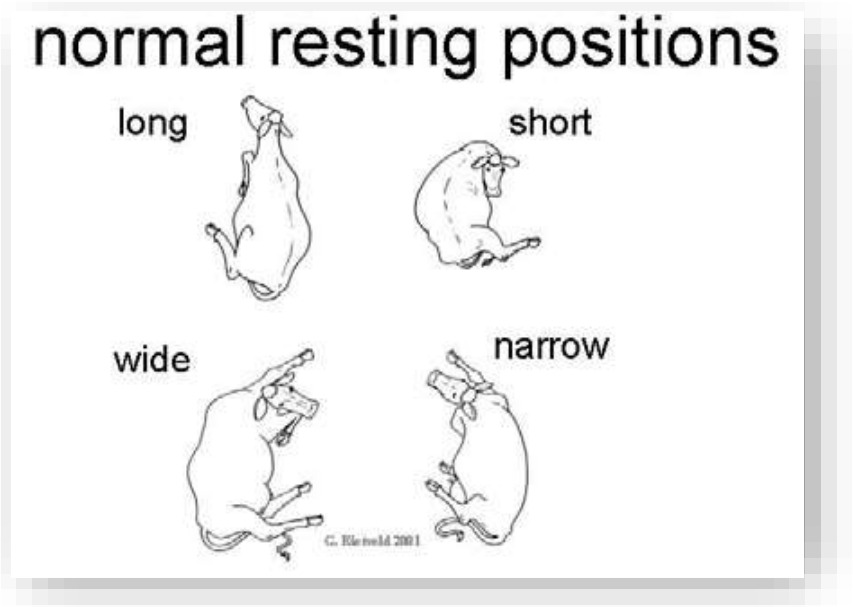
As the cow reaches oestrus the bull becomes very excited and follows her closely, licking and smelling her external genitalia and often exhibiting phlegm. Recent work has shown that the bull uses the tongue to transfer fluid (probably urine) to a short incisive spur located on the dental pad. It is then transferred to the vomer-nasal organ (Jacobs et al., 1980) which is considered to be the site of pheromone identification. Pre-copula Tory patterns include pawing the ground and snorting, chin resting on the cow's rump just before mounting and then copulation. Copulation is short (seconds) compared with horses and pigs (minutes).

The female becomes hyperactive when oestrus begins, and the number of indiscriminate agonistic interactions and mounting attempts increase. A subjective measure of the intensity of oestrus from how 'excitable' a cow seems to be, can be designated as strong, medium or weak.

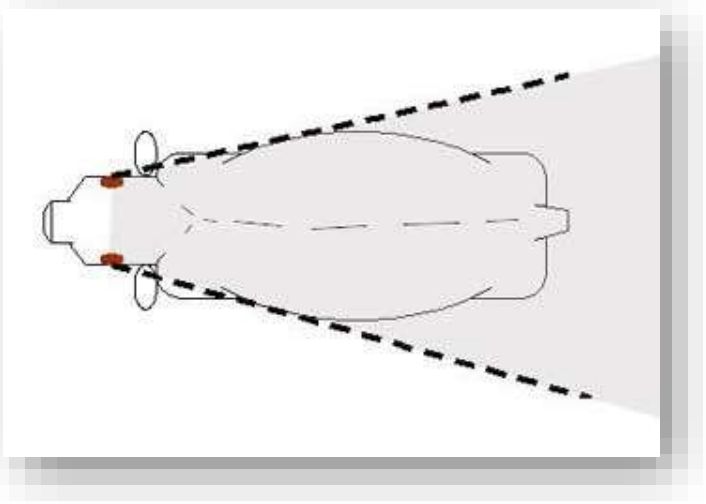
Resting Behaviour Of Cattle As An Option For Decisions Surrounding Administering Vaccines, Inoculation Or Other Chemical Treatments

Cattle rest in one of four positions. Resting describes lying in one of four normal resting positions – long, short, narrow or wide.

In the long position, cows rest with their heads extended forward. In the short position, they rest their heads along their side and go into active sleep. While in the narrow position, cattle rest more on their sternum with the neck in a slight crook and the rear legs close to the body. Their front legs may or may not be extended. In the wide position, cattle rest more on their sides with the rear legs extended. Another position is lateral recumbence where cattle lie totally on their sides with legs and head extended.



How cattle see and how it might influence decisions regarding preparation and administering of cattle treatments



With their eyes positioned on the side of the head, cattle have panoramic vision of 330° and binocular vision of 25°–50°, which allows for good predator awareness (Phillips, 1993). Despite the wide set of their eyes, however, they do have a blind spot directly behind them (see below).

- Cattle have slit-shaped pupils and weak eye muscles, which inhibits their ability to focus quickly on objects.
- Cattle can distinguish long wavelength colours (yellow, orange and red) much better than the shorter wavelengths (blue, grey and green), which may have aided their response and survival when a herd member was attacked, and blood was spilt. Cattle can distinguish all colours from a grey background except blue and have a poor depth perception. Because of this poor

depth perception and lack of definition, cattle will often baulk and refuse to cross a shadow or drain grate and are best moved through diffuse light.

- While grazing, cattle constantly sniff the pasture, but it is not known if plants are rejected on the basis of odour. Cattle can distinguish smell, e.g. they will baulk at the smell of blood and offal. The sense of touch is important in determining which herbage is rejected or preferred. The secondary/special olfactory system can detect pheromones, volatile chemicals that are important in reproduction and feed selection
- The ears of cattle are very sensitive. Cattle can be calmed by playing soothing music or stressed by loud noises such as yelling. Dairy breeds are more sensitive to sound and touch than beef breeds, high-pitched sounds, such as the whistle used to control most farm dogs, will increase the animals' heart rates. Hearing in cattle is important in inter- and intra-species communication.
- Cattle flight zones can vary greatly. Feedlot cattle may move away from people, especially strangers, entering their flight zone of 1.5m, whereas less handled range cattle have a flight zone of 30m
- Coetaneous sensitivity can be used to calm cattle by scratching under the neck and behind the ears, areas they find difficult to access.
- Sensory input at the level of the penis is important for sexual behaviour during mounting.
- Older cattle grazing on open fields will spend less time grazing than younger cattle due to their experience and learned paddock patterns

Cattle's Response To Sound And Smell And How It Might Influence Decisions Regarding Preparation And Administering Of Cattle Treatments

Noise, especially sudden, loud noise, is stressful to animals. Experiments have shown that cattle, when exposed to sustained noise, have reduced mass gains. Cattle perceive sounds of higher frequencies than do human beings. Research findings are that the classical music has a calming effect on cows.

The sense of smell is particularly well-developed in cattle. The odour of blood, or of strange cattle, will lead to animals balking when forced to enter a crush or pen. If animals are allowed to walk through a crush unhindered, a number of times, they will enter a crush readily in future.

Cattle's Personal Space And How It Might Influence Decisions Regarding Preparation And Administering Of Cattle Treatments

Observation of cattle has shown that there is a "critical distance" that must be maintained between animal and animal, as well as between animal and human. This critical distance encloses the personal space within which an animal feels comfortable. With cattle, this distance varies from about one metre in show animals, to about 50 metres, and more, where they are free ranging.

Animals attempt to maintain the critical distance at all times. Therefore, for the efficient movement of livestock, handlers should position themselves at the boundary of the animal's personal space, and keep moving steadily towards the animals. The animal will then move in the desired direction. Should an animal start to run, the handler, by standing still, allows the critical distance between animal, and handler, to be reinstated, and the animal will stop running.

Entry into the animal's personal space by the handler stresses the animal. Thus, when handlers hang over an animal, or approach it rapidly when it is in a crush, the animal is apt to rear or jump out of the crush.

The personal space required by an animal will affect the shape and size of holding pens. Long, narrow pens are more efficient than square or round pens.

Herd Behaviour And How It Might Influence Decisions Regarding Preparation And Administering Of Cattle Treatments

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The personal space required by an animal will affect the shape and size of holding pens. Long, narrow pens are more efficient than square or round pens.

Cattle and sheep have a strong following instinct. This is related to their need to maintain visual contact with each other. This "following behaviour" often causes a herd of animals to rush for a gate once one of the groups has passed through the gate. In this case, animals at the edge of the group can be flung against gate post and can be bruised in the process. This behaviour can be used to the advantage of the handler. Thus, it is not advisable to empty a crush completely, until the last group of animals in a session have been handled. If a few animals are left in the front of a crush, the next group to be herded in, will enter readily.

Individuality and Learnt Behaviour And How It Might Influence Decisions Regarding Preparation And Administering Of Cattle Treatments

Temperamental dams tend to produce temperamental offspring. There is no doubt that genetics play an important role in this behavioural pattern. Some breeds are thus known to "be difficult". Even individual animals in a 'tame" herd can be temperamental.

The second factor determining the animal's individual behaviour is learning. A skittish cow trains her calf to be afraid. A wild animal, in a placid herd, very soon upsets the others, and they become excitable, and restless. Learning also plays a role in the animal's willingness to enter a stressful area. Thus, if an animal was previously hurt (e.g. injected) in a crush, it is less willing to enter a crush in future.

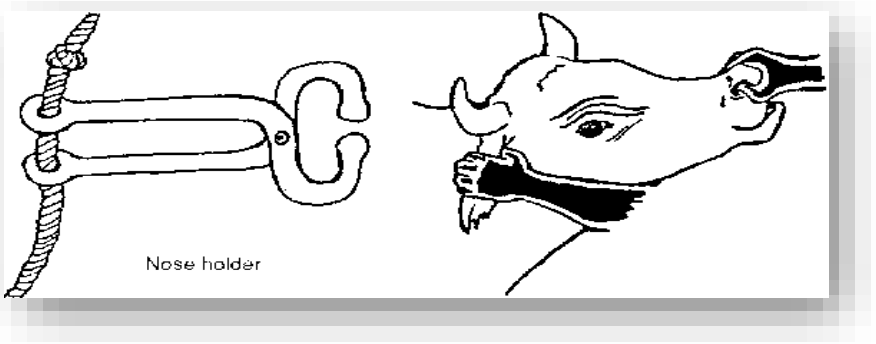
Restraining Individual Cattle And Groups Of Cattle

Restraining (controlling) Large Ruminants

The crush or race is made of wood or metal. Crushes are used for large ruminants when they are vaccinated, examined or undergo other treatments.

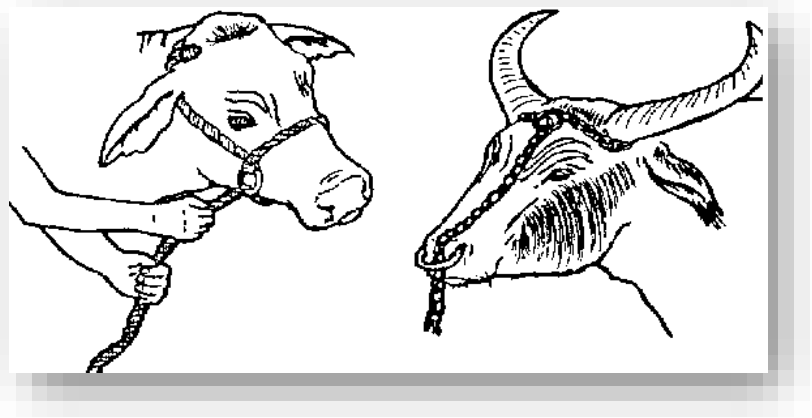
How to Hold Animals

If you do not have a halter or a nose holder the best way to hold a large ruminant is to take a firm grip of the nostril using the thumb and forefinger of one hand while holding the horn or the ear with the other hand.



Haltering Large Ruminants

Animals need to be halter-trained and this is best done when they are young so that they are accustomed to the halter. When a halter is used on an animal talk to the animal to encourage it to move. Hold the halter no more than 20 cm from the animal's cheek and walk close to its neck.



Casting or Throwing Cattle

If you do not have a crush and you want to trim the hooves of an animal, it will be necessary for you to cast (throw down) the animal.

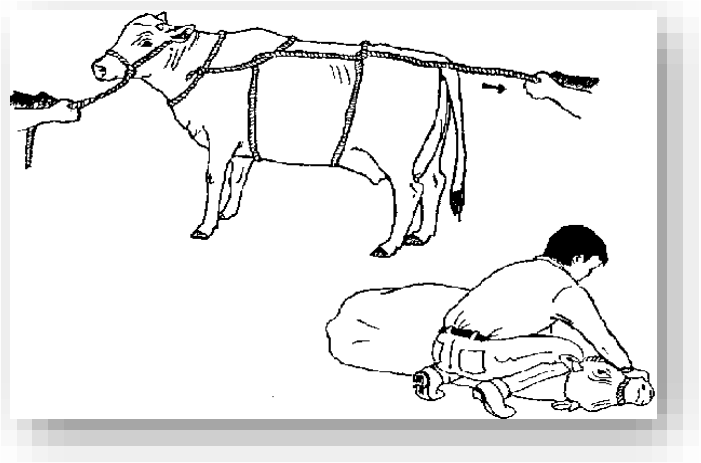
To do this you will need:

- A halter for the head.
- Two people to help you.
- Ten to twelve metres of strong rope.
- A place where it is safe to throw the animal, where the soil is soft or covered with straw.

First halter the animal then tie the long rope around it as shown in the illustration below. Have one person to hold the halter while the other joins you and pulls the rope. The animal will collapse onto

the floor and your helper must immediately put his knee on its neck and his hand on the animal's head to prevent it from rising.

Do not leave the animal down for a long time as bloat may develop.



Remember when casting animals that both the animal and people can get injured so try to do it safely.

In areas where animals are handled, illumination should be uniform and diffuse. Shadows and bright spots should be minimized. Slats on the floor of shearing sheds and other animal facilities, should be eliminated so animals walk across the slats. Flapping objects or a coat hung on a chute fence may stop animal movement.

Pigs, sheep, and cattle have a tendency to move from a dimly illuminated area to a more brightly illuminated area, provided the light is not glaring in their eyes. A spotlight directed onto a ramp or other apparatus will often facilitate entry. The light must not shine directly into the eyes of approaching animals.

Livestock have colour perception. Numerous investigators have now confirmed that cattle, pigs, sheep and goats all possess colour vision. Handling facilities should be painted one uniform colour. All species of livestock are more likely to balk at a sudden change in colour or texture.

In facilities where livestock are handled, loud or novel noises should be avoided because they distress livestock.

The sound of hanging metal can cause balking and agitation. Rubber stops on gates and squeeze chutes will help reduce noise.

POE Activity 12

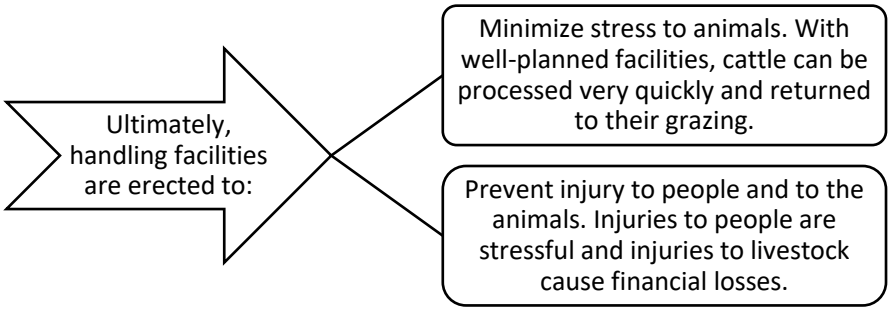
POE Activity 13

Learning Unit 11

Cattle Handling Facilities and Equipment

Cattle Handling Facilities

Cattle are large, powerful animals and, although they can become very tame when handled frequently, people are regularly injured and even killed by cattle, especially bulls. The problem is exacerbated when horns are not removed. Cattle handling facilities circumvent many problems and, once erected, provide ease of management for many years if good quality material is used.



The first step is to decide where to place the handling facility. Animals should not have to walk too far to reach the facility and placing a handling facility within reach of the farmer's house circumvents the need to travel far to fetch items such as vaccines that were forgotten at home.

The Crush

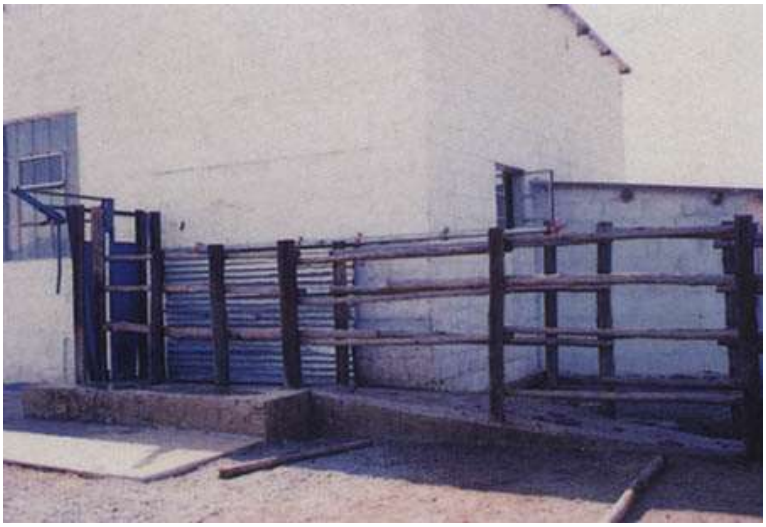
The most important part of a handling facility is the cattle crush or race, and everything should be planned around the crush.

Start with the crush, ensuring that it is sited on a slope in such a way that cattle walk uphill in the crush. Ideally the rise should not be steep (a slope of 1:70 is ideal) and the crush should be angled across the slope. Rain will then not run-down length of the crush and cause erosion. Drainage is across the width of the crush, washing the dung inside the crush away from the side where the people are standing.

Most people work with cattle from the right-hand side i.e. they use their left hands to do rectal examinations.

The width of a crush varies with the size of the cattle that will enter the crush, from 680 mm for smaller animals up to 750 mm for very large cattle.

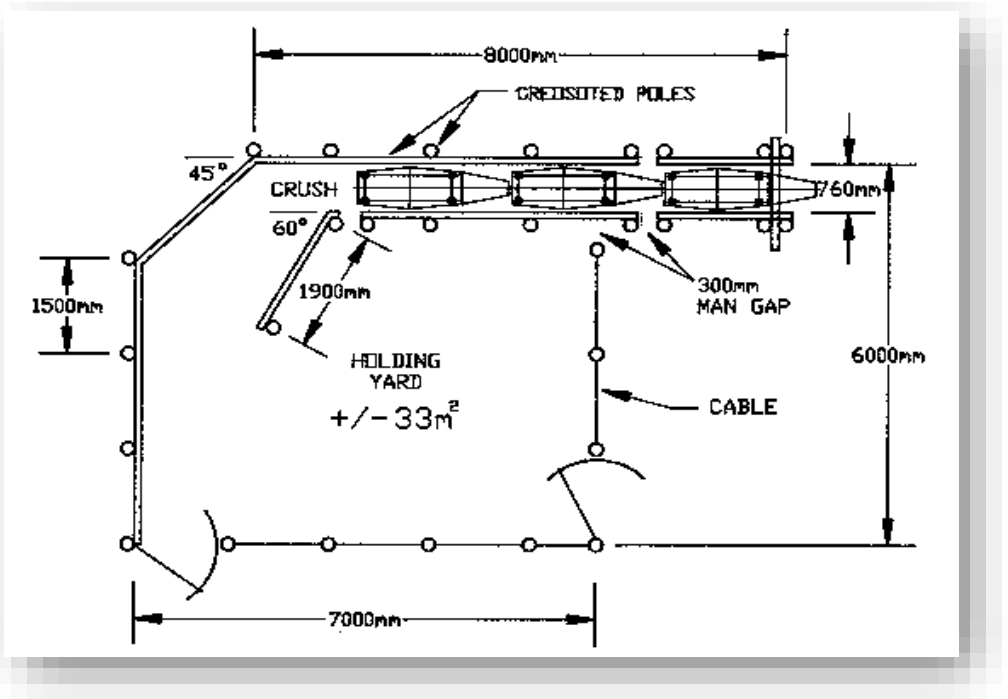
A height of 1 500 mm is acceptable for most breeds of cattle, whereas, with larger, wilder cattle, a height of 1 900 mm should suffice.



A crush can vary in length but should not be shorter than two cow lengths because cattle have a herding instinct, and should an animal refuse to enter a crush, placing a tame animal in front often entices other animals to follow. Where a crush is more than 14 animals long, efficiency is lost because people working with the cattle need to walk too far from the pre-holding area to the front of the crush and, unless spacers are provided, cattle in a long crush tend to move back when handled and crush animals in the rear. A crush length of 1 700 mm per medium sized cow is usually satisfactory. Vertical posts should be placed at one animal interval.

Many farmers like to provide for a smaller crush where calves can be handled. However, a full-sized crush can be used for calf management by adding barriers lower down. Stringing a cable between the ground and lowest horizontal pole and between the first and second horizontals prevents calves from escaping. The handler then enters the crush and works with the calves in the crush, with the neck clamp closed and the rear of the crush closed with poles. With larger calves, crush width can be reduced by hanging motor-car tyres or poles inside the crush.

Although a neck clamp is useful, a crush with a gate in front can be used for most operations by using some means to immobilise animals, such as tying their heads to the side of a crush using a leather thong, which will not cut into their skins. Loose poles placed across the crush in front of vertical posts are usually all that is needed to prevent animals exiting at the rear.

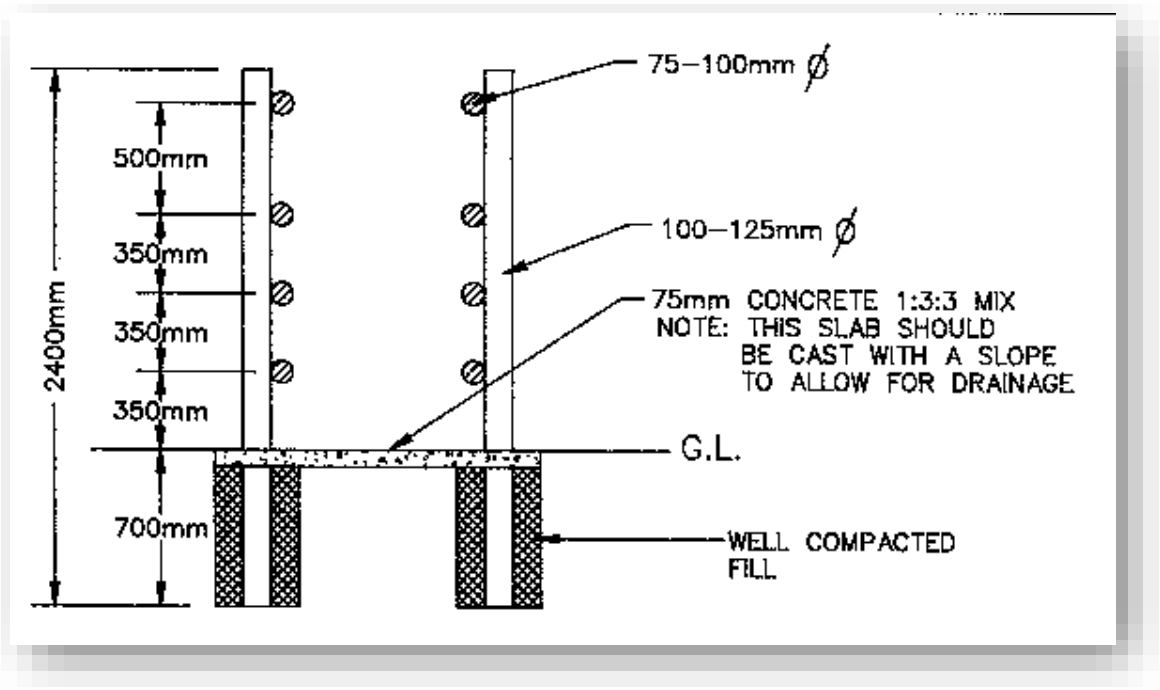


Holding Pens

Holding pens where animals are kept prior to handling must comprise an area of at least 2.3 m2 per mature cow. Where animals must remain close to the handling facility for a day or more, they should not be kept in the holding pens. Small paddocks with water must be provided for this purpose in close proximity to the handling facility.

From the holding yards, animals are moved to a forcing yard, where provision is made for only 1.67 m2 per mature cow, which makes it easier to force the animals to enter the crush. The exit from the forcing yard into the crush must be tapered to prevent animals milling around the entrance to the crush and to prevent injury to animals.

Diagram of a small cattle handling facility where the holding pen is a small kraal and the forcing yard is open to the holding pen.


75–100mm ø
100–125mm ø
75mm CONCRETE 1:3:3 MIX
NOTE: THIS SLAB SHOULD
BE CAST WITH A SLOPE
TO ALLOW FOR DRAINAGE
G.L.
WELL COMPACTED
FILL
2400mm
500mm
350mm
350mm
350mm
700mm

Clamps

A sorting area to handle cattle and a clamp to catch them

Dipping Facilities

Planning a dipping facility is best done by an engineer. It is often said that a plunge dip is better than a spray race. Research does not support this belief. It has been shown that, where the management of

a spray-race is effective, with modern dips, the results achieved in spray races are as good as those achieved in plunge dips in terms of tick control.

Many plans for handling facilities are available. The above comprises a summary of basic principles to assist in choosing an acceptable facility. The size of the facility must be decided by the number of cattle a farmer has and what size herds will be processed at a time. Costs could play a role, but, considering that a handling facility which is well built can last 15 years or more, additional expenses for a good facility are usually warranted. Figure 12 illustrates a very small handling facility for a farmer owning 5 to 10 cows, which can also be used on larger farms in remote paddocks for the treatment of the odd sick animal.

Cattle Handling Yard Plan Design

The cattle handling yard plan designed by Mr T L B Hilliar, a leading beef farmer in the Eston area of Natal who built the prototype of the design in 1979 is a prototype used by many

This yard can easily be adapted to handle from 50 to 1 000 head of cattle, so it can suit any enterprise. As can be seen from the plan, the cattle enter a curved corridor from which lead any number of holding pens, radiating from a circular forcing pen. Each holding pen can accommodate 100 animals comfortably (2,32m2/animal). The combined circular forcing pen and crush also hold 100 animals, but under forcing pen conditions (1,67m2/animal). As a result, a holding pen can be emptied, and be ready for re-use by the same group of cattle, after they have been handled. Owing to the long-tapered shape of the holding pens, 100 animals can easily be moved into the circular pen by one man.

A farmer who has a small herd can also use this design of handling yard.

Siting and Design Of Handling Facilities

The handling yard is sited below an existing cattle corridor, or in a corner formed by two corridors.

A site with a fall of 2 to 3% is desirable. The first section to be laid out is the draining races for the plunge dip or spray race. This is give a fall as indicated on the plan. The crush is then laid out parallel to the draining race, and from there the rest of the layout can be completed using a rope and tape. If laid out as above, the cattle movement is always up-hill, except when returning to the holding pens. If neither a spray race not a plunge dip is required, then allow a fall of 350mm in the crush from the neck clamp to the crush entrance.

The Forcing Pen

The forcing pen is circular, with the lower fence of the crush running into the centre of the circle. Animals entering the pen move round the circle to reach the mouth of the crush. The final part of the circle is straightened in order to create a fence angled at 450 to the crush entrance. The first two-

metre length of the crush is tapered from a width of 1,20m to 760mm. This section can be useful when treating large bulls, which otherwise would not fit into the crush. They are backed out into the forcing circle after treatment.

The Crush

The crush is long, so fewer batches of animals have to be handled. A neck clamp is fixed at the exit, and a scale is situated alongside the crush, for use only when needed. Note that there are no obstructions along the entire length of the lower fence of the crush. This allows for quick dosing, or pregnancy testing. The upper gate of the loading ramp pen should be of strong construction, so that it can double as a sorting gate to the loading ramp pen. This pen can also be used as an extra sorting pen.

The Dip Or Spray Race

Cattle are diverted from the circular sorting pen into a separate race by swinging the 3-metre heavy-duty gate to block off entry to the handling race. The cattle then pass through a single, long foot-bath to the dip, or to the spray race. The double draining race can accommodate about 16 animals on either side, and allows an almost uninterrupted flow of cattle, provided that the entry swing gate and the exit gates are used correctly. The draining race shown on the plan is for a spray race. If a plunge dip is used, the draining race will be shorter, but wider, to accommodate the same number of cattle.

Calf Separation

Calves can be separated from the dams by incorporating a small, strong gate in the crush where indicated. The camp into which they are separated should have heavy-gauge netting wire fixed around the perimeter to contain the calves.

Suitable Materials

Fencing for the holding pens, and the entry corridor:

Cable or twisted plain wire should be fixed through holes drilled in the upright poles. Pressure can then be taken from either side. Instructions are given on this plan for making cable from wire if reject cable is unavailable from the mines, lift companies or Eskom.

All poles shown are standard sizes, so no cutting should be necessary, and every vertical pole required is actually drawn on the plan to assist the farmer when he is ordering materials. Note that joints of horizontal poles are lapped up and down, alternatively, instead of being half-cut and lapped, because the latter method bares the untreated core wood, resulting in early deterioration. Cup square bolts are very expensive, so all joints are fixed with mild steel round bar and wire.. It is recommended that

the standard size gates used should be of the more robust, sale-yard type. The sorting gates/crush at the neck clamp should be constructed of 50mm ϕ, G & F, round tubing with 3mm thick walling, and with horizontal spacing, the same as in the crush.

Creosoted poles (S.A.B.S. standard) or C.C.A. treated poles should be used. (The latter types are not recommended in areas with a dry climate because cracking can occur under such conditions). The C.C.A. treatment involves the use of copper sulphate and arsenic, and poles thus treated should otherwise last as long as creosoted poles.

For herds of up to 200 beasts, the smaller handling yard with two or three 50-animal holding pens should suffice, provided that batches of 100 animals are handled at a time. Herds substantially larger than 200 animals can be handles in 100-animal holding pens, the number of holding pens being proportionate to the number of animals being handles at one time.

The attached bill of quantities gives the material required for a complete, full-sized handling yard with one 100-animal holding pen. Quantities for every additional 100-animal holding pen are given separately. A separate bill of quantities is given for the smaller handling yard with one 50-animal holding pen, and quantities are given for every additional holding pen.

The materials for any section that is to be omitted can be left out when making out a list of total requirements.

The Correct Handling Equipment

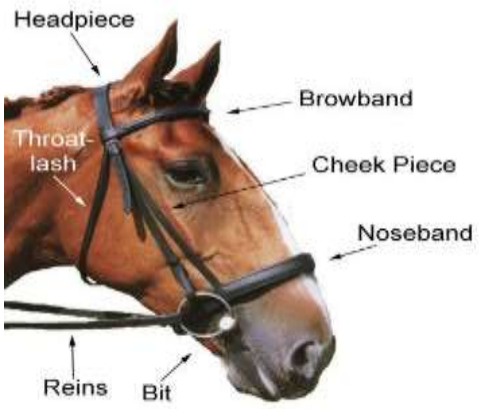
Having access to good handling infrastructure / facilities goes a long way to create a safe environment in which to handle animals. Points to bear in mind when designing and constructing handling facilities are:

- Use strong and durable materials that can withstand heavy and sudden weight, are easy to clean and do not readily splinter.
- Ensure that floor surfaces are suitably rough to prevent slipping of animals and humans.
- Construct handling facilities under cover or in a shady and wind protected area so that workers do not tire too quickly, and animals do not get agitated in extreme weather conditions.
- Fences and gates need to be in a good state.
- Electric fences need to give a good strong signal to be effective - check the volt reading regularly. Avoid chasing animals towards an electric fence. They will ignore the fence and break it.
- Different species need different sizes and shapes of infrastructure.

- All movable parts of the handling facility need to be free moving (grease or oil joints and hinges from time to time)
- All stables, boxes, crates etc. that are to be used to contain animals, need to be thoroughly checked before they are used. Special attention should be given to sharp objects and loose wires in the handling areas.

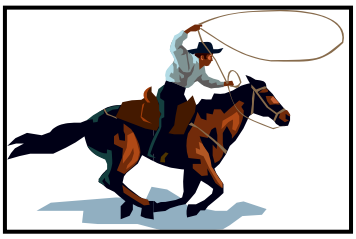
Equipment to Physically Restrain Animals

Halters



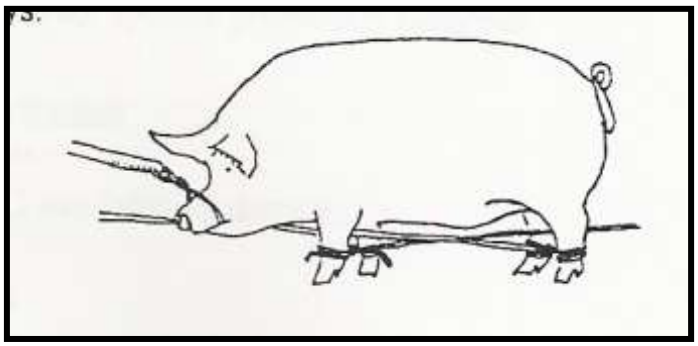
A halter can be used in almost all ruminants especially if you want to lead it calmly.

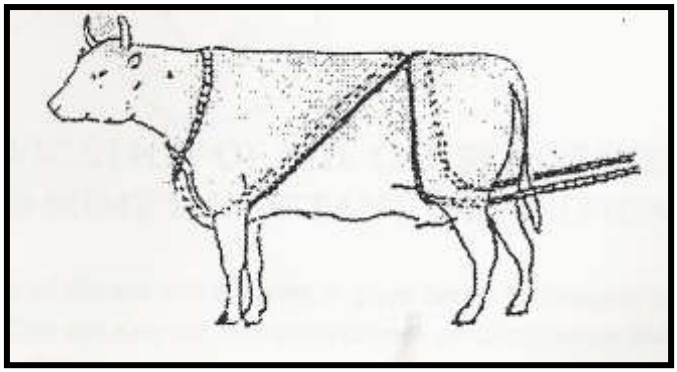
Throw Lariats



These are ropes used often by cowboys to catch and hold animals such as cattle and horses

Casting Ropes





Used for throwing over of an animal so that it can be managed on the ground

Handheld nets

Traps

Nose clamp

Learning Unit 12

Correct Handling of Animals

There is a lot of routine work that goes on, on a farm. That is work that the farmer and the worker do every day to care for the animals and sometimes to harvest products of the animals such as feeding cows and milking them routinely. To do most of the routine work on a farm it is necessary to come into contact with the animal or to handle them.

General Principles In Handling Of Animals

- The approach and all actions should be done in a calm and unruffled manner. Avoid a wild approach.
- Sounds and noise should be limited to a minimum, especially with single animals.
- Animals should always be talked to first, to make them aware of the presence of the handler. Individual animals in particular, should be addressed in a quiet, even and calming way.
- Any action or movement should be performed slowly and deliberately. Sudden movements will cause animals to become excited and restless.
- The safety of the operator and his assistants should be the first consideration.
- The safety of the animals, causing of injury and unnecessary pain must be considered.
- Always ensure that assistants know exactly what they have to do.
- See to it that the best available aids are at hand.
- Use the most suitable facilities that are available for the particular purpose or that can be constructed easily and practically. This is necessary for effective handling and will also save much time.
- Individual animals should always be caught and controlled by people they know and by whom they are normally handled.

Approach To Animals

The approach to animals will depend on the following factors:

- **Kind of animal -** For example the approach to horses is totally different from that of cattle, sheep or pigs. The approach to dogs and cats differs and is altogether different from that of the other species.
- **Breed -** A Thoroughbred or American Saddler is more highly-strung and nervous than a Percheron or Boerperd and should be approached more calmly. Similarly, there is a big

difference in temperament between for example Afrikaner and Friesland cattle, Merino and Namaqua Africander sheep, Boer goats and Angora goats, etc.

- **Sex -** Male animals are generally more aggressive than female animals, for example, a Jersey bull as compared to a Jersey cow, a ram as compared to an ewe, etc. Male animals are also physically stronger than female animals.
- **Age -** older animals are usually calmer than younger animals. On the other hand, older animals may be more aggressive e.g. an old bull or ram. Young animals should always be handled in the presence or with the aid of tame ones and preferably their mothers.
- **Individuals or groups of animals –** The approach to a single horse is different to that of a number of horses or a single cow or sheep to that of a herd or flock.
- **Tame or untamed animals –** This will immediately determine the approach to be followed, for instance a tame horse can easily be approached and caught, while other methods must be used with an untamed one. A tame animal could, however, have acquired certain habits.

Different Approaches Apply To Different Animals

Horses

The first thing to do when approaching a horse is to make it aware that you are coming by means of whistling softly whilst walking towards it and talking softly as you come close to it. Unless a horse it very tame, it must always be driven towards a corner of the kraal, fence or crush and whilst doing all this, your hand must be lifted and stretched slowly and gradually until you softly touch the neck. Gradually touch the neck until you gently reach to the head and rub it gently. Then put the halter on the head. If the horse it too wild it may be necessary to use a crush pen. In some instances, tame animals may be used to press the wild one or, in the case of young horses, the presence of their mothers can be used as a means of catching them.

Cattle

Handling cattle depends on the breed. For example, handling dairy cattle is easier than handling most beef cattle. Dairy cattle are usually tame because they are always handled in the milking sheds and thus, they are generally familiar with handling. Bulls, whether they are dairy cattle or beef, must be always handled with care. A crush pen or paddock may be used to catch them. When handling bulls, one must never use bare hands only. A bull pole should be handled using a nose ring. Calves can be handled well in their calf pens. When working with animals, one must always be calm and avoid too much whistling and abuse to them.

Sheep and Goats

Goats and sheep are usually easier to handle than large stock. No talking is required when handling them. If one wants to catch a goat or a sheep, it is always better to do this in kraals or crush pens unless sheepdogs are used which can assist in rounding the flock up and directing them towards a gate or kraal. A sheep or goat can be caught with its hind leg from behind or with its horns if it has horns. Too much whistling should be avoided when working with sheep or goats.

Pigs

Pigs can be driven together if they are a group. Also, when handling pigs, they should be approached from behind and this can be done in their pigsty. Special crush pens can be used for pigs when available.

Dogs and Cats

The best persons to handle these animals first are their owners before a stranger comes along. They are not handled as a group but as individuals. One should handle them calmly. Dogs and cats must be approached directly from the front slowly and calmly. When approaching a dog, you must stretch your hand slowly from a distance and gently touch its headfirst.)

Control Defensive Behaviour In Animals

To study different species' or animal types' normal as well as its defensive behaviour you need to study them in their natural environment. Therefore, you must choose species that are easily found in your area. In order to understand what constitutes "defensive behaviour" it is important to have a very clear idea of what constitutes "normal" behaviour and how this varies during the different lifecycles of the animal.

For the purpose of this study "defensive behaviour" is defined as any animal behaviour that may pose a threat or risk to another animal or human being. Animals will thus display defensive behaviour to humans and other animals within and between species. The "kiewiet" that makes a noise and runs around to distract the intruder from its eggs or young express defensive behaviour but does not pose a threat to anything.

Knowledge of animal behaviour is not something that is picked up overnight from books. It is therefore important for you to expose yourself to different situations of dealing with animals as often as possible.

Long-term observation will help with future identification of abnormal behaviour patterns.

Factors Stimulating Defensive Behaviour In Animals

- Driving animals from one place to another can stimulate a defensive behaviour if the animal feels threatened in the process of being moved.
- When you have confined animals in a crush to administer medication such as dosing, injections and inoculations, you should expect resistance and defensive reactions because the animals are confined and feel threatened.
- Defensive behaviours will most certainly occur if you intrude too closely to the young of an animal. The mother (and sometimes also the father) will defend its young.
- Threats caused by other animals may also stimulate defensive behaviour.
- Similarly, loud sudden noises or sudden movements can also scare animals to defend themselves.
- When an animal has repeatedly been hurt through beating, whipping or prodding, then it may react aggressively to a person holding a whip or a stick.
- When males are in rut, they are particularly aggressive.

Typical Problems That One May Encounter Due To Defensive Behaviour

The most common problems that are encountered in the handling and feeding of animals are usually as follows:

- Breaking out of confinement and straying.
- Breaking equipment, facilities and infrastructure.
- Refusing to enter buildings / facilities / cages / transportation / confined areas etc.
- Struggling during handling.
- Threatening and / or attacking humans or other animals.
- Self-mutilation (hurting /harming themselves)
- Accidental injury to the animals themselves.
- Injury due to competition and pecking-order fights.
- Abnormal defensive behaviour as a result of some disease such as rabies or mad cow disease.
- Attacking people or animals in the vicinity. A good example of a type of animal/insect attacking people or animals is honeybees. When the people working with the bees wear protective gear then the bees may attack people in the vicinity not wearing protective gear.

It is always better to feed animals separately in pens or feed animals of the same age and size together. Where it is not practical then you must make sure that there is enough trough space and ration so that there will be limited competition among the animals.

Examples Of Abnormal Behaviour

When dogs become aggressive the hair on the back of their necks and backs raise up. Stallions prick (lift up) their ears and wag their tails. Bulls, buck and rams paw the ground with their front feet. Birds and reptiles puff themselves up to look larger than they really are.

Although house pets such as dogs and cats can be very calm and friendly to their masters and friends, they will change their behaviour when a new-born litter arrives. Special attention must be given in such a case to their behaviour; they may sense a threat to their young when suddenly approached. Look out for their warning signals like a grunt or hiss to tell you to back off.

In a farm situation, it is necessary to report defensive behaviour to the supervisor. Sometimes animals can act defensively for other reasons than the obvious.

Animals can exhibit discomfort in different ways when exposed or kept under stressful and unfavourable conditions. Some of these symptoms can be:

- **Pacing and route tracing:** This happens when animals are kept in a place where they cannot escape such as a cage. For example, hens kept in a cage pace because they do not have access to a social environment.
- **Rocking, swaying and weaving:** This kind of behaviour shows boredom in animals.
- **Rubbing:** Animals such as pigs can start rubbing their heads or even bang their heads leading to injuries when restricted in a narrow single stall.
- **Pawing or stall kicking:** When horses are frustrated because of not getting food they will start pawing which can lead to leg injuries.
- **Head-shaking and nodding:** Caged domestic fowl or caged birds can start showing this kind of behaviour because they cannot escape the obvious observer when frustrated in their movements.
- **Eye-rolling:** Is shown by calves in pens.
- **Sham-chewing:** Where no litter is available this behaviour is shown by pigs by chewing when there is no feed in the mouth.
- **Licking or crib wetting:** An animal repeatedly licking its own body can lead to the abrasion of the tongue. This condition is caused by inadequate food.
- **Drinker pressing:** Caused by boredom. The animal tries to reduce boredom by pressing the drinker repeatedly without drinking the water.
- **Feather pecking:** Often seen in poultry due to social dominance in intensive husbandry due to poor ventilation, high temperatures, low humidity, excessive population density and insufficient space.

You have thus learnt that animals have different ways of showing discomfort, and animals have different ways of acting defensively. Now, how should you respond to bring defensive behaviour under control?

Situations That Can Trigger Defensive Behaviour

Certain things have to happen to an animal for it behave defensively. These have to do mainly with handling practices. Some of the things that stimulate defensive behaviour in animals are:

- **Shouting:** Most domestic animals are irritated by shouting especially if they are not used to it. For example, dogs that are used to gentle handling can easily bite you because they are stimulated to defend themselves.
- **Stress:** Animals can experience stress as a result of unpleasant environmental conditions. Stress can result in animals showing strange physical behaviour such as defensive behaviour because the animal will become very irritable. Causes of stress can be pain, unfavourable living conditions such as very cramped housing and poor ventilation, and transportation (especially long distance transportation can cause the animals to be very irritable). However, some animals are more tolerant than others, for example, sheep and cattle are more tolerant to painful stimuli than horses, dogs and cats.
- **Beating the animal:** Beating the animals painfully can immediately stimulate defensive behaviour, especially if the animal is a less tolerant animal such as a horse or dog.
- **Manipulation:** This refers to stressful activities that include vaccination, castration, separation and transportation that can be very stressful to the animals such that its defensive behaviour is stimulated.
- **Threatening the animal:** When animals are purposely threatened, either by your body movements or shouting, it can be an immediate stimulus to an animal to defend itself.

Thus, if you avoid doing these things the chance of eliciting a defensive reaction will be reduced.

Ways Of Responding To Defensive Behaviour

The first would obviously be – Get out of the way!! Get out of the camp, or the pen, or the crush, or the corner, or the room, or the space that you are in with the animal. Get out of the animal's way! The reason is to avoid injury to yourself, a bystander or the animal. Getting out of the way will then give you a chance to think about the most appropriate next step.

The following assessment of the situation can then be done:

- Is there something (other than yourself or a bystander) which is causing the animal to respond defensively? For example: there may be a barking dog or a snake in the animal's space. Or,

maybe there is a thorn between the animal's hooves, or the animal may be injured (internally or externally) and is in extreme pain.

Once you have determined what the problem is, you can then respond as follows:

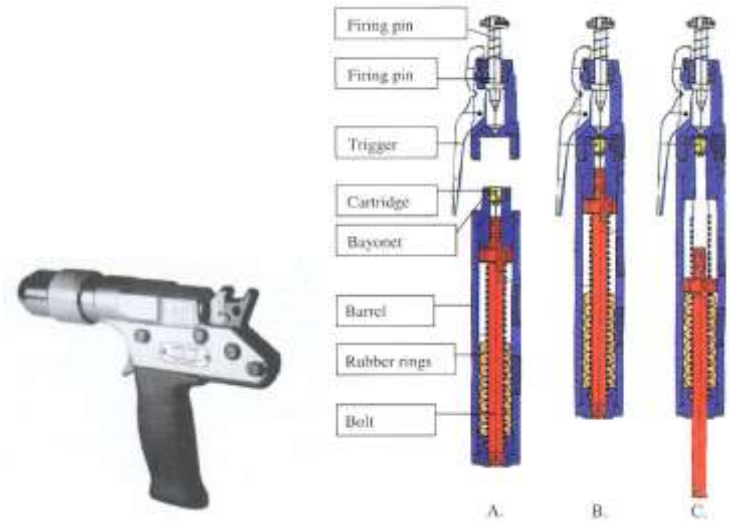
- Remove that which is causing the defensive behaviour – For example: the dog or the snake
- If the animal is acting defensively because it does not want you to handle it, it may be necessary to subdue the animal. This can be done by one of the following ways:

Chemically Restraining the Animal

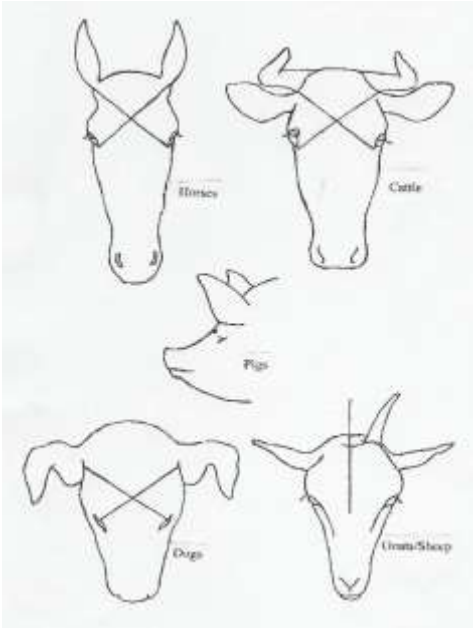
- Tranquilizers are compounds that calm or quiet anxious animals. For example: Neuroleptics (ACP) or anti-anxiety drugs like valium.
- Sedatives are used to relieve irritability or excitement
- Anaesthesia can be provided (either complete or partial) which causes a complete loss of feeling or sensation and muscle relaxation (This can be done especially if the animal needs to be operated on).
- These compounds can be administered either intravenously (difficult with an anxious animal), intramuscularly (easier to administer) or with a blow dart or darting gun (if the animal is impossible to approach).

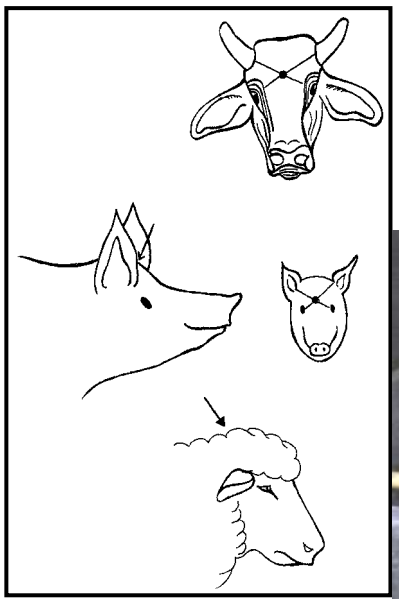
Destruction Of The Animal (A Last Resort) – Euthenasia

- Captive bolt pistol – this is a hand held weapon for euthanasia of large animals. The muzzle is placed against the subject's forehead (different species have different locations). When the trigger is pulled a 3cm rod, 1cm in diameter exits sharply to pierce the skull and damage the brain. The rod does not leave the weapon and there is no possible risk of injuring a bystander.

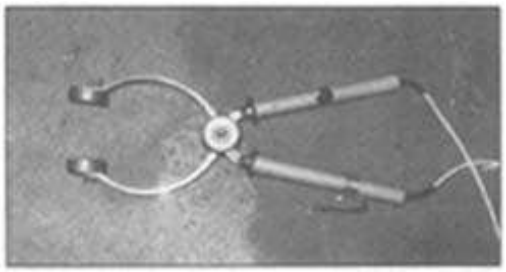


Correct points to aim for with a captive bolt





- **Shooting with a bullet -** (same procedure as above – but caution must be taken regarding harming oneself or bystanders).
- **Chemical euthanasia –** A Chemical compound is usually administered intravenously to cause immediate and painless death.
- **Slaughter –**
  - Firstly, the animal should be stunned – This is the passage of a low voltage current through the brain to cause unconsciousness. The current is passed through a pair of tongs clamped to the head like a pair of earphones. It is used mostly in abattoirs for pigs or poultry, but also for lambs, kids and calves.
  - The throat is then slit.


An electrical stunner


A sheep being stunned before slaughter

Minimize Risk When Working With Animals

Animals, and especially large stock such as cattle and horses, are strong. Special care must be taken when such animals are handled.

Potential risks when working with animals include such aspects as:

- Poisoning by venom.
- Contraction of tetanus as a result of injury by an animal. (It is advisable to have yourself and the animal vaccinated against tetanus).
- Contracting a variety of zoönotic diseases such as brucellosis, TB, Rabies, endo-parasites, mad-cow disease.

It is for the prevention of such problems that Bio-security regulations should be applied.

Definitions:

Zoonotic: a disease which can be transmitted between animals and people.

Tetanus: an acute infectious disease characterized by tonic spasm of voluntary muscles especially of the jaw and caused by the specific toxin of a bacterium (Clostridium tetani) which is usually introduced through a wound.

Rabies: an acute viral disease of the nervous system of warm-blooded animals that is caused by a rhabdovirus (genus Lyssavirus) usually transmitted through the bite of a rabid animal and that is characterized typically by increased salivation, abnormal behaviour, and eventual paralysis and death.

It is often necessary to handle animals intensively. When animals are contained in kraals or crush pens for any purpose such as dosing, drenching, inoculating, branding and in modern times, dipping with modern "pour on" dips, the animals are threatened in a way. This action can cause injury to the animals as well as the handlers.

All workplaces should have documented basic procedures that must be followed when workers are dealing with potentially dangerous animals. These procedures should be put up somewhere on display.

These procedures should form part of the workplace's Health and Safety Regulations and should include the following:

- Where the First Aid Kit is kept.
- Who the Health and Safety officers are and how to contact them?
- Who to contact in case of a medical emergency (both human and animal)?
- Who to contact in case a dangerous animal has escaped into a public space?
- Which level of worker is allowed to work with what category of animal under what circumstances?
- What protective wear is expected to be used under what circumstances.
- Who is allowed to administer sedative drugs to animals, where they are kept and how they should be administered?
- If biosecurity (public protection from contamination with animal pathogens) is relevant, procedures to apply Biosecurity should be listed.

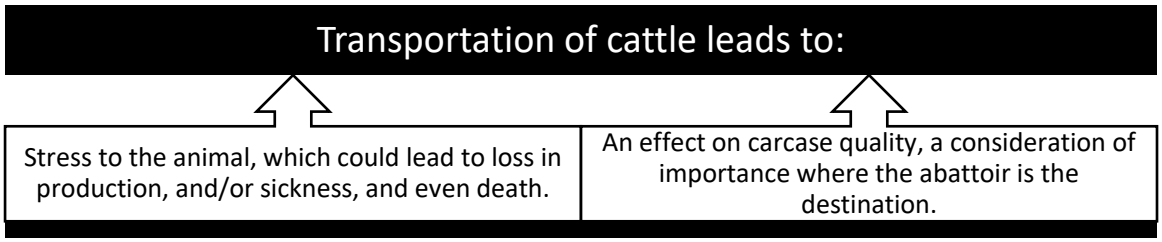
Because of the potential danger of working with animals and equipment, all employers are obliged by law to pay a levy to the Commissioner of Workman's Compensation. These funds are then available to assist with the medical attention needed by a worker should he or she has an accident or is injured in the workplace. As an employee you are entitled to be re-assured that your employer is paying the levy.

Learning Unit 13

Transportation of Beef Cattle

Transportation of livestock is an integral phase of any livestock enterprise. The ability to transport animals means that the producer is not entirely dependent on local markets. Should markets in the immediate vicinity be over-supplied, the producer is able to overcome this by selling on markets further afield.

Problems Related To Transportation



Modes of Transportation Available For Cattle

Many factors should be considered when selecting the mode of transport. Cost is always important, but must be measured against the quality of, and potential losses incurred in, transport.

- Herding by road was the only form of transport available in the not-too-distant past, and it is still the main method of moving cattle on the farm, and often from farm to farm. Where sale yards or railway loading points, are close by, it is still the cheapest way to move animals. When animals are moved at their natural pace, and if the distance is not too great, stress as well as loss (e.g. bruising, shrinkage) is minimal. A comfortable distance for beef to walk in a day is 10 to 12 kilometres.
- Transport by rail has been a major factor in allowing the centralisation of the industry and in opening new markets. Rail transport should continue to fulfil this role for a long time to come, although it has become less important in the transportation of slaughter stock.
- Road transport is taking over a major portion of livestock transportation due to the ease and convenience of transporting cattle by road. It is an important means of reducing stress to livestock. Animals in transit undergo "shrinkage". This is due to reduced water intake, and to poor food consumption which is characteristic of animals in transit. Shrinkage can amount to 4 to 6% for trips of less than 70 km, but can be as high as 8 to 9% for distances exceeding this. Road transport reduces travelling time, and partly overcomes shrinkage.

Selecting The Mode Of Transport

When deciding on the mode of transport, convenience, and cost, must be the major criteria. Allowing animals to walk to their destination, time permitting, is cost-effective, and reduces stress. The only limitation is distance. Although many animals can travel great distances on the hoof, this is not advisable where the abattoir is the destination. Should a farmer decide to herd animals over distances greater than 30 km, care should be taken to plan the route well. Rest and watering points must be identified over the whole route, and the distances travelled each day must not be excessive.

Rail transport is usually cheaper than is motor transport and should always be considered for all forms of livestock. A limitation of rail transport is that the farmer has to pay for the full use of a truck, whether it is full or empty. Farmers need to plan the moving of a consignment of animals well ahead of time in order to request the required number of trucks. Cattle trucks containing livestock are carefully monitored and taken to their destination as quickly as possible. In spite of this, delays do occur. For this reason, rail transport is not always ideal for moving animals to the abattoir.

Road transport is the mode of choice in most cases, because of convenience and efficiency. Animals can be moved to their destination within a matter of hours. There are usually no long delays between requesting the transport, and the actual moving of the animals.

Truck Design

The following should be taken into account when evaluating the suitability of a vehicle, or railway truck, for cattle transport:

- Floor space: This should not be less than 1,4m2 per adult bovine. A small calf will require 0,3m2. Where there is a height factor to consider, the roof height should not be less than 1 600mm. Should animals have too much room, they can be thrown around inside the vehicle when it is moving off or coming to a rapid halt. With the correct number, animals tend to lean against one another, and against the sides of the vehicle. This prevents excessive movement. Partitioning in large vehicles is therefore essential.
- Floors: These should be solid and impervious, and, most important, must be fitted with grids or cleats to prevent slipping. There must be no spaces between the floor and the side panels.
- The sides of the vehicle, and the partitions, must be strong enough to hold the heaviest animal. Preference should be given to sides with solid surfaces, and openings should not allow legs or heads to become stuck. The minimum height for both sides and partitions is 1 800mm.
- Ventilation must be adequate. This should not prevent the inclusion of adequate protection against bad weather, sun, rain and wind. Exposure to exhaust fumes must be avoided because this can cause discomfort, and suffocation.

- Gates warrant attention. A small loading gate has the advantage that the animals cannot turn around, until on the vehicle. Cattle, however, often crash against the sides of a narrow gate, thus injuring themselves. Off-loading gates could span the full width of the truck. This would be possible by designing tip-up gates. The gate used for loading animals ideally, should be narrow, but only if it is to be used in conjunction with a loading crush.

Correct Weighing Procedures For Vehicles Used To Transport Cattle

A weighbridge assists in accurately weighing loads ensuring that the weight of cattle corresponds from dispatch to delivery and that vehicles are not overloaded. Weighbridges are usually found at abattoirs, on national roads and at central dispatch points. Weighbridges are calibrated frequently and usually ensure accuracy of weighing and are also usually connected to a recording system which produces a document that accompanies the load to its destination to be compared with the load at the new destination.

Animal Welfare during Transit

Animal Health And Injury

The stress associated with transport can cause animals to become ill. Pregnant cows are particularly susceptible. Symptoms very similar to those associated with ilk fever are often precipitated. This is related to calcium metabolism and can be treated in the same way as milk fever. Prevention is achieved by restricting feed intake for two to three days before loading. Feeding hay, at maintenance level only, is recommended.

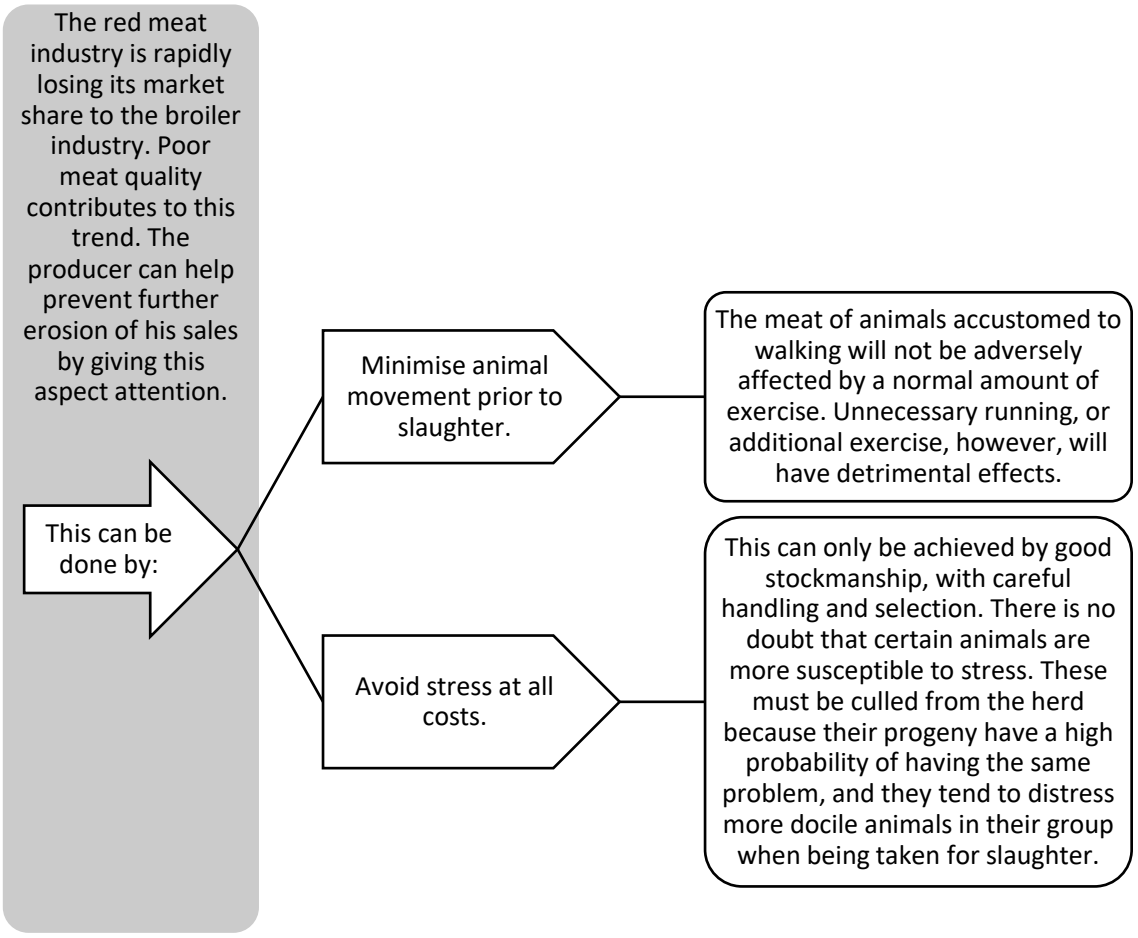
Transit fever is another disease encountered. This is a form of pneumonia caused by a Pasteurella species. A vaccine is available to treat animals which are due to travel.

Injury to animals is a major source of concern, not only because the public image of the meat industry is adversely affected by media reports of animal maltreatment, but also because the producer suffer major losses due to injury, and bruising. This subject is considered in greater detail in Natal Beef leaflet 6.4 (“Bruising of beef carcases”). Financial losses associated with injury can be minimized through animal knowledge, and improved truck design.

It is not advisable to transport cows during the last trimester of pregnancy. Should the need arise to transport cows and suckling calves, it is advisable, in order to prevent injuries, to transport them in separate trucks. However, with trips exceeding two days, cows and calves should be grouped together, since the consequences of excessive stress to the calf could exceed potential losses due to injury.

Carcass Quality

The tenderness, flavour, and colour of meat are adversely affected by excessive exercise, or stress to the animal, prior to slaughter. Meat also loses its ability to retain fluids, making it unsuitable for sausage making.

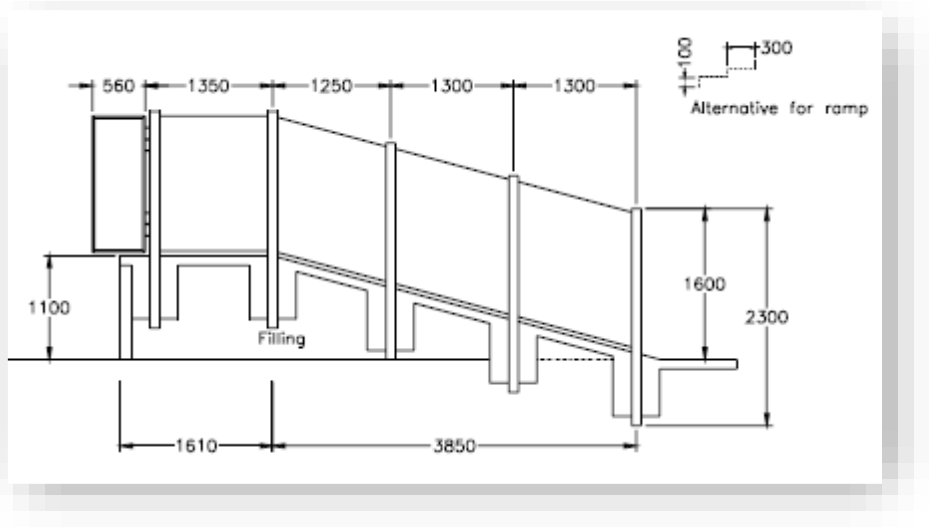


Welfare Guidelines For Transporting And Loading Cattle

A loading platform must be designed as such that the cattle can be loaded fast so that the first animal does not get a chance to walk back. The height of the loading platform is determined by the height of the back of the truck or transportation vehicle. As general directive, a height of 1,1 to 1,2 m for trucks are accepted.

A loading platform which is built at a steep angle causes injuries; therefore, the gradient must not exceed 16°. This is equal to a one-meter increase over 3,5m horizontal distance or 1,1m increase over 3,85m. Loading platform floors can become very slippery and must therefore be made very coarse. A diamond pattern is recommended. The width of the loading platform is the same as that of a crush,

e.g. approximately 750mm. For the collection of cattle, a wider loading platform can be used. The figure below shows the construction of a loading platform.



Loading Platform

Cattle are normally afraid of heights and a loading platform with a solid floor and solid sides gives the best results. Loading platforms must however be provided with swing gates which can swing open into the truck. This will prevent cattle from jumping off between the truck and the loading platform. Telescopic sides which can be extracted into the truck are also suitable, but if they are bent by the cattle, they can impair the operation.

It is preferable that the top of the loading platform should be horizontal for approximately 1,5m. A curved loading platform with an inner radius of 4,5m gives better flow results than a straight loading platform. The loading platform must also have a catwalk on the sides on which the handlers can move to help with the loading process.


TALTEC

Tips for Handling Cattle

Keep cattle calm – Calm animals are easier to move and load. When cattle become agitated, it takes up to 30 minutes for them to calm down.

Move cattle at a walk or a trot – Injuries from falls and bruising increases when cattle run into gates and fences.

Reduce noise – Cattle have very sensitive ears and yelling and whip cracking stresses them. Handlers should not yell or constantly whistle.

Eliminate Electric Prods – In most facilities cattle can be loaded and unloaded without electric prods. A flag or paddle stick or other non-electric aid should be a person's primary handling tool. Truckers and handlers must not constantly carry around electric prods. Several feedlots have greatly reduced costly dark cutting carcasses by eliminating electric prods during truck loading. If an electric prod is needed it should be used on a stubborn animal and then put back down.

Use Behavioural Principles – Handlers should be trained so that they understand the behavioural principles of flight zone and point of balance.

Make Cattle Flow – Cattle will move up a ramp and onto a truck more easily if they are quietly driven up to the ramp and immediately loaded. Do NOT allow cattle to stand and turn around in the crowd pen that leads to a loading ramp. Cattle should not be brought up to the loading ramp until the truck is ready to load.

Remove Distractions – If cattle refuse to move up a loading ramp or down an alley, remove distractions that cause them to balk. Some common distractions are seeing people up ahead, reflections off puddles, vehicles parked near the chute, dogs, or a piece of chain hanging down. Painting the facility one colour to reduce contrast and installing solid fences on ramps and around pens will often improve cattle movement. Solid sides improve movement because they prevent cattle from seeing distractions outside the fence.

Acclimate Cattle to Handling – Cattle should be accustomed to being moved by a person on foot before it is time to ship them to a packing plant. Cattle that have never seen a person on foot are more difficult to handle and more likely to become bruised or have more dark cutters. Acclimating cattle to people moving them on foot also improves safety for truck drivers and handlers.

Critical Control Points for measuring the quality of handling and facilities for loading or unloading of trucks. Each CCP is assessed on a yes/no basis for each individual animal.

Falling Score	1. **Percentage of Cattle that Fall Down or Slip** Fall is one of the most serious problems that can occur during loading and unloading. This CCP includes cattle that fall or slip inside the vehicle. Excellent – No slipping or falling Acceptable – Less than 3% of the cattle slip Not Acceptable – 1% fall down (body touches floor) Serious Problem – 2% fall or 15% or more slip. A slip is scored if slipping causes an obvious changing in the animal's movement.
Speed Score	2. **Percentage of Cattle that Move Quietly at a Walk or Trot that do not Run or Jump** Excellent – 90% or more move at a walk or trot Acceptable – 75% or more move at a walk or trot Not Acceptable – Less than 75% move at a walk or trot Serious Problem – Less than 50% move at a walk or trot
Electric Prod Score	3. **Percentage of Cattle Prodded with an Electric Prod** Excellent – 0% moved with an electric prod Acceptable – 5% moved with an electric prod Not Acceptable – 20% moved with electric prod Serious Problem – Over 20% moved with an electric prod or an animal is moved by an abusive method such as hitting it hard or poking it in a sensitive area such as the eyes, nose, mouth or rectum.
Cattle Striking Objects	4. **Percentage of Cattle that Strike Objects such as a Truck Door, Truck Deck, Gates or Fences.** Rubbing against a flat smooth surface such as the inside of the trailer is not counted. The following events should be scored as striking an object:

	A. Cattle bumps back on truck deck B. Cattle bump into the side of the truck door or jams against the door. C. The animal's head strikes a fence or gate. D. An animal is caught between the end of a gate and a fence. E. Cattle bump into a gate latch or bump a gate strike post. One score is tabulated that includes inside the truck, loading or unloading ramp and pens, fences and gates in the immediate vicinity of the ramp. Excellent – 0% strike an object Acceptable – 1% strike an object Not Acceptable – 2 to 5% strike an object Serious Problem – More than 5% strike an object

Conditions on the Transport Vehicle

Stocking Densities

Trucks and stock trailers should be loaded per the stocking densities on the table below. Overloading of trucks will increase the chances of an animal going down on a truck. Bruising is also increased when trucks are overloaded.

Table. Recommended Truck Loading Densities

Feedlot Fed Steers or Cows, Avg. Weight	Horned or Tipped or more than 10% Horned and Tipped	No Horns (polled)
360 kg	1.01 sq. m	0.97 sq. m
454 kg	1.20 sq. m	1.11 sq. m.
545 kg	1.42 sq. m	1.35 sq. m
635 kg	1.76 sq. m	1.67 sq. m

Driving Methods

Careful driving will help prevent bruises and injuries. It will also help reduce weight losses. Rapid acceleration or sudden braking should be avoided because poor driving can cause animals to lose their balance. Air ride suspensions are strongly recommended to provide a smoother ride.

Prompt Unloading

Trucks should be scheduled so that they can be unloaded promptly when they reach the plant. Trucks should be unloaded within 15 minutes after arrival. Non-Slip Flooring – A new aluminium trailer has good non-slip footing but cattle start slipping when the diamond plate floor becomes worn. Cattle ride easier on no slip flooring. One sign of a slick trailer is more manure on the floor. Slipping agitates cattle and causes more elimination. Slipping can be reduced by welding small bars or aluminium mesh on the floor.

Reduce Heat Stress

When the Livestock Safety Index is in the emergency and danger zones, if possible, cattle should be transported at night or in the early morning. In double shifted plants where this is not possible, vehicles must be kept moving because heat builds up rapidly in a parked vehicle. Heat stress is especially a problem when cattle that are acclimated to living in a cold climate are transported to a hot climate.

Prevent Cold Stress

Since cattle are ruminants, animals that have been acclimatized to cold weather can withstand very low temperatures. The most dangerous conditions are freezing rain because it wets the hair and destroys its ability to insulate. During freezing rain conditions, drivers must make sure that sleet is not blowing into the side of the trailer. During a sleet storm it would probably be advisable to pull off and stop to prevent wind chill from stressing or possibly killing the cattle.

Checking the Load

Drivers should check the cattle to make sure no animals have fallen down every time they stop at a weigh station or truck stop. Downed cattle are likely to be trampled and injured. Sometimes an electric prod has to be used to induce the animal to stand because entering the trailer would be dangerous.

Vehicle Maintenance

Both the tractor and the trailer must be kept well maintained. Broken gates, ramps, decks and latches in the trailer must be replaced or repaired.

Vehicle Cleanliness

Vehicles must be washed a minimum of once a week. One study showed that dirty trucks were a source of pathogens that could contaminate the meat. Ideally trucks should be washed daily or after each load. This is especially important if the truck hauls cattle to many different places.

Driver Incentives

Implementation of financial incentives to reduce bruises and weight loss should be used to motivate drivers. Drivers who are financially rewarded will be more willing to handle cattle quietly and to drive carefully.

How to Handle And Transport Non-Ambulatory Animals

If a non-ambulatory animal has to be transported it should be placed in the rear compartment of a double deck trailer near the door or transported in a single deck vehicle. The non-ambulatory animal should be loaded onto the vehicle without being dragged. The best method would be a purpose built truck with a powered lifting tailgate to raise the animal to truck level. Lifting tail gates which would lift the animal on a level platform are commercially available for use on delivery trucks. Another alternative would be a forklift equipped with a metal platform. The use of bare forklift forms on a wooden pallet is not acceptable. Both of these devices are too narrow to support the animal. Dropping a non-ambulatory animal off the back of a truck to ground level is forbidden.

Dragging the downed animal is forbidden.

Acts of abuse such as beating or sticking any object into a sensitive part of the animal such as the eyes, nose, mouth or rectum is forbidden.

Dropping the animal from a height of more than 30 cm is forbidden.

Part 4 - Predation

In this part we explore the following:

- Identifying problem animals
- Why is wildlife management important?
- What kinds of damage does wildlife cause?
- Tracking principles
- How to improve protection for livestock?
    - Protection methods
    - Habitat modification
    - Repellents
    - Barriers
    - What guard animals can protect my livestock
    - Population control methods
- Euthanizing animals in case of injury by predators
- Working with nature not against it

Leaning Unit 14

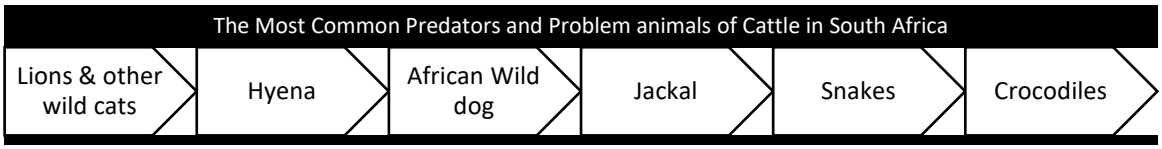
Predation

Problem Animals

Predators are wild animals that hunt or prey on other animals as a source of food. They are Carnivores (Carnivore), meaning it is natural for them to kill and eat meat. Livestock is looked after by people and they have as a result not evolved to run as fast as wild prey species and are thus 'easy targets'. Predators learn hunting techniques from their own group when they are young and once one animal has found a way to hunt livestock, it will teach the others.

In general, it is important to note that predators actually prefer wild prey and tend to take more livestock during the dry season when predators are weak and have less energy to hunt.

Rapid expansion of livestock farming throughout Africa is leading to greater conflicts between predators and humans and has reduced the amount of wild prey available to predators. Predators kill livestock causing large financial losses and in turn humans destroy the predators. The problem is multiplied on the edges of protected areas as predators are often drawn out of parks for the water that is always present for livestock, and then they discover a grocery store full of easy prey items; the good life until their untimely death



The identification of the predator involved in killing livestock and animals is fairly difficult to master as there are many variables. Sometimes scavenger/predators get blamed for a kill when in fact they are just eating what was killed by local dogs or died of natural causes. Getting to the carcass quickly after the animal's death is critical for proper identification of the guilty species.

Damage Identifications General Principles

- Predation is rarely observed; therefore, the accurate assessment of losses to specific predators often requires careful investigative work.

- Determine cause of death by checking for signs on the animal and around the kill site.

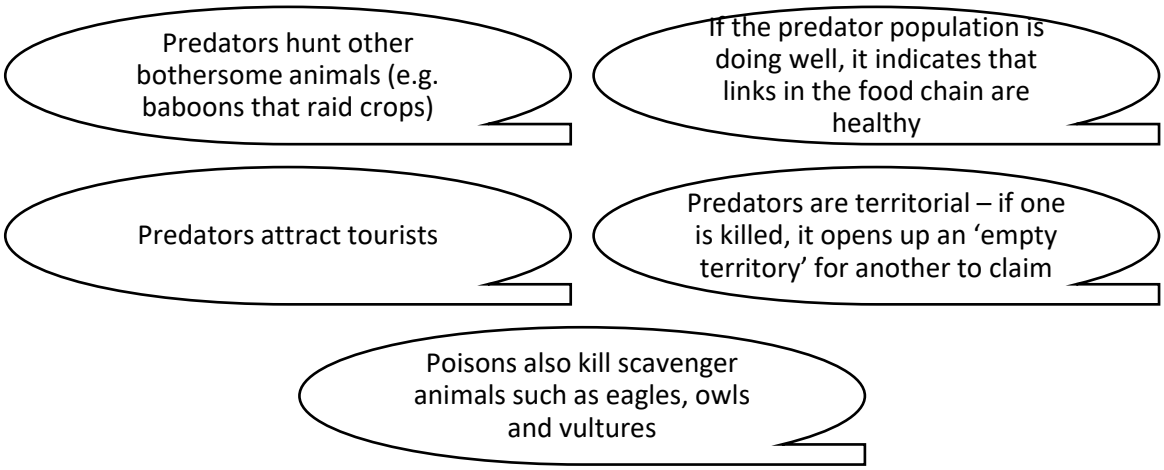
- Size and location of tooth marks will often indicate the species causing predation.
- Extensive bleeding usually is characteristic of predation. Where external bleeding is not apparent, the hide can be removed from the carcass, particularly around the neck, throat, and head, and the area checked for tooth holes, subcutaneous haemorrhage, and tissue damage. Haemorrhage occurs only if skin and tissue damage occurs while the animal is alive. Animals that die from causes other than predation normally do not show external or subcutaneous bleeding, although bloody fluids may be lost from body openings. Animal losses are easiest to evaluate if examination is conducted when the carcass is still fresh. Animals may not always be killed by a throat attack, but may be pulled down from the side or rear. Blood is often on the sides, hind legs, and tail areas. Calves can have their tails chewed off and the nose may have tooth marks or be completely chewed by the predator when the tongue is eaten.
- Tracks and droppings alone are not proof of depredation or of the species responsible. They are evidence that a particular predator is in the area and, when combined with other characteristics of depredation, can help determine what species is causing the problem.

Many livestock operations include extensive pastures which feature ravines, scrub land and woodlots. These situations are likely to be attractive to predators.

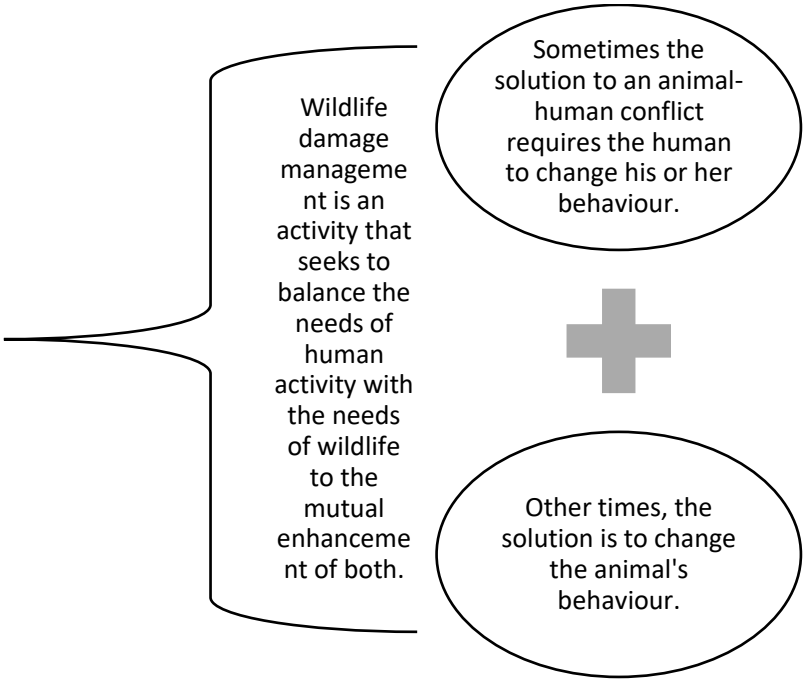
The identification of the predator involved in killing livestock and animal is fairly difficult to master as there are many variables.

All over the world, people have to protect their livestock from attack by predators. Livestock owners often resort to shooting or poisoning predators, but it is important to take note of non-lethal control methods.

Why Protect Predators?



What is Wildlife Damage Management?



Various tools and strategies are used to reduce human-animal conflict, such as behaviour modification, repellents, exclusion, habitat modification, relocation, lethal control etc. Wildlife damage management is truly a diverse and complex field.

How To Improve Protection For Livestock?

Prevention is an imperfect discipline. Animals adapt to our methods and materials and workmanship break and decay over time. Monitoring and maintenance are necessary in any prevention program. Acting quickly before a problem gets out of hand will save you a lot of trouble down the road.

Habitat Modification

Predators, like all wildlife, need shelter and cover to survive. Changing the landscape to reduce the ability of the predator to hide and stalk livestock can help reduce predator efficiency.

Repellents

Often not effective on four legged predators but can be effective for birds.

Kraals

Kraals are a widely used method of protecting livestock from predators and are used across much of Africa. A Kraal is an enclosure which is used to keep livestock safe. Typically, livestock is let out to graze during the day and then returned to the kraal for the night. The kraal can be constructed in a

number of ways. One of the most common is a thorn bush kraal where thorny branches are used to create a wall which keeps predators out. Other construction methods include the use of wicker (woven poles), wire fencing, wood or stone walls.

The kraal should have high enough sides to stop a predator jumping over them and into the kraal. It also needs to be strong enough to keep the livestock inside. If cattle smell a lion outside the kraal, then they can easily panic and stampede - and if the kraal isn't strong enough then they can break out of the kraal to where the lion is waiting.

Research has shown that a kraal is most effective if its sides are thick enough or constructed in such a way that the predators cannot see through the walls of the kraal. When making a kraal out of wire mesh, cloth can be used to screen off the lower metre or so of the fence to stop the predators seeing through. With thorn bush kraals then making the thorn bush walls thicker helps restrict the view of the predators.

Another factor shown to be key to the success of a kraal is the number of gates in the walls. Ideally there should just be a single gate.

The kraal should be sited near a home so that if there is a disturbance at night, it will be heard and can be investigated immediately.

Moving livestock in and out of kraals can be seen as extra work for a farmer, but it has several benefits. Firstly, the livestock is a lot safer if it is kept in a kraal at night (when predators such as Lions, Leopards and Hyenas are most active). Secondly by making sure the animals are counted in and out of the kraal then any missing animals can be quickly noticed, and a search started for the missing animal. In contrast, farms where the livestock is allowed to wander freely during the day and night may not notice a missing animal for a much longer period. Also, when moving the livestock in and out of the kraal the farmer is able to visually inspect the animals to identify any health problems, and get sick or injured animals treated.

Kraals should also be used for calving animals. Keeping the calves and their mothers in a separate kraal for a few months after the birth of the calf gives the calf extra protection at the time when it is most vulnerable. This increases the chances of survival of the calf.

Fencing

Although it is not always practical, fencing grazing areas is one option to reduce or eliminate the threat from predators. By using wire fences plus electrified strands, it is possible to create a fence that will keep predators out. Fencing like this is expensive and is only generally used on larger commercial farms. Fencing has to allow places for animals such as warthogs to cross under the fence (usually using swing gates) as they would otherwise simply dig their way under the fence and leave an easy entry point for predators. Fences also need regular inspection and maintenance to ensure they are in good working order and there are no gaps for predators to enter.

Herding

In parts of Africa it is usual to see herds of cattle, or flocks of sheep and goats roaming around with nobody watching them. While this is the easy option, it is also the least effective way to ensure the safety of the livestock. Predators are opportunistic and unguarded livestock is an easy meal for them. In East Africa, the Masaai keep someone with the herds of cattle to watch for threats from predators. If spotted, then a predator can usually be scared off.

Guard Animals to Protect Livestock

One way to protect livestock is through the use of livestock guarding animals. Usually these are dogs, but other animals such as donkeys are sometimes used. Guarding dogs protect the livestock by patrolling, scent marking and barking. They act as a deterrent to predators, particularly smaller predators such as caracal and cheetah, and will also chase off predators they see.

Guard donkeys, guard dogs, and guard llamas have all been used successfully to protect livestock. The choice depends on the livestock being protected, local terrain, hectare area, predator threats, budget, and personal preference. Whichever animal you choose, count on some training, extra feed, vet care, and housing expenses.

In some cases, you may need more than a single guard animal to protect livestock. Guard dogs can work together to patrol large areas and to fight off marauding packs of e.g. feral dogs and jackals that would overwhelm a single guard dog. Dogs and llamas sometimes can be trained to work together.

Guard animals can be effective, but in some situations, packs of predators will defeat the most diligent guard animals. If you are following an aggressive rotational grazing program, with livestock in several paddocks at the same time, you may need a guard animal for each paddock. Sometimes, even in a small field, a single guard animal can be overwhelmed.

Donkeys

Donkeys have been used for centuries to protect sheep and other herding animals. Donkeys are extremely intelligent, with acute hearing (there is a reason for those big ears) and sight, and they are conservative by nature: they do not like change in their surroundings, and will drive off a predator or stray dog as much because it is an intruder as from any instinctive dislike of canines.

Donkeys are easy to care for — good grazing or hay and water is all they need — and delightful farm pets, if you accept that they are clever and rigid.

But not all donkeys are instinctive guards. Some will ignore an intruder, and there are stories of donkeys who run away from intruders, and donkeys who attack the livestock they are supposed to protect. If you're shopping for a guard donkey, stay away from intact (stallion) jacks in favour of a gelded jack or a jenny (female). Some breeders test and/or train donkeys for guard duty and will sell them with an agreement that will allow you to exchange the donkey for another if it doesn't work out as a guard. Remember too that a jenny with a foal may be too busy to watch livestock. Even a jenny in season is thinking more about jacks than about predators. Two donkeys together may spend their time playing donkey games instead of watching for predators.

Guard Dogs

Guard dogs have been used to protect livestock from prehistoric times. The breeds used have ranged from mix-breed dogs to the traditional guard dog species: Akbash (Turkey), Maremma (Italy), Komondor and Kuvasz (Hungary), Liptok or Chuvatch (Czechoslovkia), Tatra or Podhalanski (Poland), Ovcharka (Caucasus), Shar Planinetz (Yugoslavia), and the Great Pyrenees (France). By tradition most guard breeds are light-coloured; the light coloured dogs are all-but-invisible to predators when they bed down with the livestock, and they are easily distinguished by a herdsman from darker-coloured predators.

Guard dogs have been bred and trained to enhance a trio of traits. To be effective, the guard dog must bond with the animals it is protecting, it must be courageous in the face of a predator, and it must accept the responsibility of its job. The dog lives day and night with the livestock it is protecting and can be stand-offish toward people. Despite this essential independence, the owner needs to establish him or herself as the *alpha* figure in the dog's world.

Guard dogs have a repertoire of techniques to defend their livestock from predators. They are sensitive and primitive enough to be able to *read* the intent of a predator, and to use the minimum measures necessary to defend the territory and flock. Attacking the predator is the last resort, after other measures have failed. The first line of defence is a perimeter marking with faeces and urine that warns predators to *Stay out!*. If the markings do not deter a prowling predator, the guard dog will warn the predator with a staccato bark that announces *Stay where you are; I can see/smell/hear you.* If that fails, the bark escalates to a loud warning. If the predator persists in the face of the warnings, the guard dog will advance and charge at the predator, barking. The next step is a shoulder blow to the predator, saying, *I can expose your jugular and kill you if you persist.* The final defensive action could include killing the predator.

Guard dogs are bonded with the livestock they are supposed to protect by being introduced to stock as puppies, generally from 8 to 12 weeks. Once bonded, dogs accept the animals they are guarding as equals, or even as dominant. It takes some training and patience to get the bond right; puppies are playful, and will sometimes chase, bite, or even kill stock. Eventually, a good guard dog learns its role, and will acknowledge an irate cow guarding her calf by moving away, lying down, or averting its eyes. Guard dogs live with the stock they guard, bedding down with the animals. Most guard dogs are fed with the stock. Sometimes stock will eat the dog's food, although most dogs learn to protect their food.

Guard dogs are by disposition independent. Most will make their rounds at some time during the day and spend a good deal of time at a favourite spot where they can watch the flock and the surroundings. It takes training and experience to teach a guard dog to accept pets and other adults, while not losing its instinctive wariness toward predators. When it spots an intruder, the dog will position itself between the intruder and the flock and make threatening gestures toward the intruder. If the intruder does not withdraw, the dog will attack. These are brave dogs, not afraid to attack predators much larger than themselves.

Some potential problems with guard dogs include wandering, chasing or playing with stock, and dogs that are territorial rather than bonded to the flock. The early training of the dog needs to take place in an enclosure, so the dog learns not to wander. Some dogs later need a strand of electric fencing around the pasture to remind them where they should stay. Animals that chase or play with stock must be curbed immediately; the challenge, sometimes, is to teach a dog how to hold its own against

aggressive animals. There are also cases of dogs with territorial instincts. A territorial dog can do a good job as a guard, as long as the livestock doesn't move to a new grazing area while the dog is protecting the old turf. Finally, predators can overwhelm even the best guard dogs; in some instances, guard dogs may solve a predator problem for a number of years, until the number of predators is so great that losses return to pre-guard dog levels. A guard dog may be successful against some large predators, even small cats, but a full-grown or large predator may overwhelm a trusted guard dog.

Guard dogs are not pets. To do their job, they need to have a primary identity and bond with the livestock they protect, rather than with the owner or family of the owner. Trying to mix the roles will confuse the dog and lessen or destroy the effectiveness of the dog as a guard.

Anatolian Shepard Dog

Anatolian Shepherd dogs originate in the Anatolian plateau of Turkey. A plateau is a high, flat-topped mountain like Table Mountain. Summers are hot and dry, and winters are cold, but the Anatolian Shepherd Dogs live outside all year round. They were bred to guard sheep against predators and are still used for this purpose.

The breed still exists in Central Turkey. From ancient days they have defended sheep from dangerous animals like bears, and wolves. They have also been used as fighting dogs in wars, & as hunting dogs.

They are large, imposing dogs, but not too heavy and fat to run fast! Agility is an important factor - not size alone. They must be able to stalk & chase a cheetah! Anatolian shepherds reach maturity at around 4 years of age.

In Namibia & South Africa, Anatolian shepherd dogs are being used on farms to protect flocks of sheep & goats from jackal, caracal, leopard & cheetah. God created all the animals for a purpose. We only live on earth temporarily. Let's not shoot all the wildlife but use natural means like dogs

to protect our assets! If we destroy all the small animals, the big predators will have no choice but to kill domestic animals for food.

The cheetah is the fastest land animal, able to accelerate from standstill to 80 km/h in only three seconds; its top speed is 120 km/h. Their spines bunch up and release as they run, and their hips are flexible. At top speed, a cheetah does not touch the ground for eight meters. It is flying! Cheetah is the most endangered African cat. If these cats see a big dog, they are unlikely to approach! This is a much better way of controlling them than using cruel traps or poison.

Temperament

Anatolian Shepherds are alert, observant, and intelligent dogs. They are protective & possessive towards their families and territory. Care should be taken when friends visit! Careful bonding with the owner is necessary in puppyhood, in order to control a large dog when it is grown. This breed will not suit a meek, unassertive owner! The dog must not take charge of the owner!

Anatolians excel at guarding flocks, and if they are to be used for this, they should not be treated as pets, but should live outside in all weathers with the flock, from a puppy. Thus the dog adopts the sheep as its family that it has to protect. One dog can protect a large flock of sheep.

If they are pets, then a big, secure yard is needed, and they should be taken for walks or runs every day.

Colour & appearance

All colour patterns and markings are acceptable, but the usual colours are fawn with a black mask, pinto, white and brindle. The dogs have black lips, a black or brown nose and muzzle. The almond shaped brown eyes may be outlined with black or brown.

The head is big & broad. Ears normally hang down but stand up when listening. The neck is thick & powerful.

Anatolians have a solid robust neck, and their legs are long and straight with muscular paws. Their tail hangs low and has a slight curl at the bottom.

The back is short in proportion to the leg length.

Guard Lamas

Llamas are intelligent, instinctively dislike canines, and are capable of protecting livestock from some predator attacks. A tall, alert llama can be intimidating to a predator. Because they are ruminants, llamas can eat the same diet as a flock of sheep or goats they are guarding. They can be expensive to purchase, and in most areas, vets have little experience with llamas. A guard llama should always be gelded. It is generally recommended that llamas not be gelded before one year of age because of problems in the growth of leg bones if the male hormones are not available.

Although the snorting and stomping of a llama can be an effective deterrent against a prowling predator, llamas can themselves be vulnerable to packs of predators. Many llama breeders now refuse to sell llamas as livestock guards because their guarding manner — out of natural curiosity, a llama walks *toward* a marauding predator — can increase their vulnerability. Many sheep farms have had good luck with llamas as guard animals. Some llama breeders use guard dogs for their llamas.

Population Control Methods Include

Poisoning – not recommended as it often affects other animals as well

Trapping – only recommended if the traps don't harm the animals and the animals can be released elsewhere out of the traps

Hunting – not recommended and often illegal

Trapping

A live trap is a trap that doesn't kill the animal. They are generally built by employing a cage with a trap door that lowers when the animal crawls into it. Bait is placed inside the cage and the animal's weight trips the door and closes it. Live trapping is an effective animal control alternative that is both humane and earth-friendly. Whether you are successful in catching a live animal depends on choosing the right bait and location among factors.

It is recommended that you get all the necessary information from local vets and authorities before setting a trap to determine the lawful method of releasing a captured wild or nuisance animal. Many species are protected by law.

The following tips should be used when preparing to live catch your nuisance animal:

Testing The Trap

Following the instructions contained in the carton, you may want to test the trap and spring it a few times to make sure that it works properly. For example, spring it by touching the trip plate from each end.

This should be done also after the trap has been set and camouflaged to make sure it works freely. If you feel the doors do not work fast enough, place small stones or other weights on top of the door. This will cause doors to drop faster.

New Traps

When you receive the trap, it will be bright and new. Therefore, do not be discouraged in case you do not catch what you anticipated the first night or day. The effectiveness of traps usually improves with age. Some animals do not mind a new trap while others do.

So instead of setting the trap to catch the first animal to come along, bait the trap, or simply place it where you intend to set it and fasten the doors open by means of a stick or wire.

After a couple of days, when you notice the bait has been disturbed or taken, it is time to set the trap.

Camouflaging your Trap

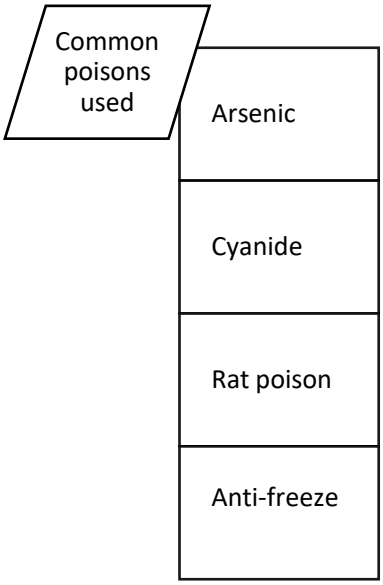
Camouflaging the trap is an effective means to entice the animal.

Place twigs and leaves all over the trap to remove a lot of the glare from the trap. You can even spray it with water and throw dirt on it to give it a conditioned look.

Animals will not be discouraged from entering the trap by the smell of your handling the trap or from supposed machine/oil odours in the manufacturing process.

Poisoning

Poisoning animals is not recommended, and you also run the risk of the cattle of the farm ingesting the poison. Here follows some information on common poisons encountered and some recommendations for antidotes.



The use of chemical compounds will, and should, always be controversial. Most poisons kill sentient animals inhumanely and should not be considered for use on vertebrate animals. However, some poisons Kill as humanely as any other lethal method and can often be applied in ways not possible with the other methods. This is very significant in the light of the facts about the learning ability of the animals. As many acceptable control options as possible need to be used to effectively stop damage. The most effective weapon against abuse is to furnish the affected parties with the ability to stop damage in acceptable ways.

The toxic collar being an example. This is the only method yet devised that has the potential to be 100% selective in killing only damage causing individual predators. The Coyote Getter, when used with pheromonal lure is another indispensable tool to be used in selectively alleviating predator damage. The prerequisite is proper training to empower the livestock owner to use the equipment effectively.

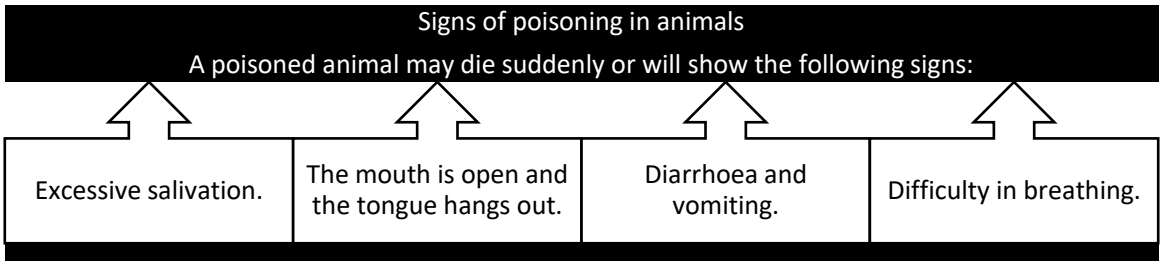
Poisoned carcasses have been popular in the past and this caused an untold amount of damage to our natural heritage. This abuse has been whittled down to small Single Lethal Dose Baits (SLDBs) that are still in common use the world over. SLDBs has little application in damage control. It has been used mainly in population suppression efforts, but when dealing with the intelligent animals that we encounter in ADC, it proves not to be effective. It mostly targets the wrong sector of the population and animals in any particular area learns to avoid the baits. The fundamental problem with SLDBs in ADC is that it is bait and that damage causing individuals are the least prone to take bait.

Lures to get SLDBs more selective have been suggested. All the really selective lures that has been discovered has pheromonal properties and is not perceived as food by the animal. They may even pick up the bait in their mouth and carry it for a distance, but then drops it. To get poisoned the animal has to swallow the bait! This is where the coyote getter comes into its own with a pheromonal bait. When the animal picks it up it sends a deadly dose of cyanide down the animal's throat.

The chemical used as poison has to be screened and selected with great care. There are thousands of poisons on the market - by definition all to kill. Some show selectivity between taxonomic groups of animals but this could not yet be fully utilized in the vertebrate ADC field of operation. When distributing poison in our environment extreme responsibly is a prerequisite. Environmentally damaging poisons have been promoted by well-known and respected conservation NGOs, by not properly investigating the substance.

Agricultural poisons may only be used as prescribed on the label. When eelworm or stemborer poisons are used to kill predators, it is illegal. There is quite a stiff fine or even jail time for a person when caught.

Selectivity almost always is dependent on intimate knowledge of the target animal (even individual) as well as the non-target animals present, and thereby use of the best equipment for the situation, but most importantly the exact placement of the equipment. This is as true of SLDBs as it is of leg hold traps or capture cages.



Causes of poisoning in animals

There are many causes of poisoning in animals:

- There are very many poisonous plants. You should talk to your community and discover what poisonous plants are in your area.
- Seeds for planting may have been treated with chemicals. If animals or humans eat these they can die..
- Strychnine is a poison which can be used to kill wild dogs and wolves. It will also poison other animals
- Weed killers used in agriculture may be poisonous.
- Chemicals used to kill insects on plants or used for dipping against external parasites.
- Old paints, kerosene, diesel and other fuels and oils.
- Poison used to kill rats and mice.
- Animals can be poisoned by salt if they are not able to drink a lot of water.
- Sometimes people deliberately poison animals.

Treating Poisoned Animals

You cannot do much in a case of poisoning. You should ask for veterinary help as soon as possible. Try to discover what caused the poisoning and stop other animals from being poisoned.

Charcoal mixed with water and given as a drench is a good treatment for poisoning. Give 1 g m for every 20 kg of body weight.

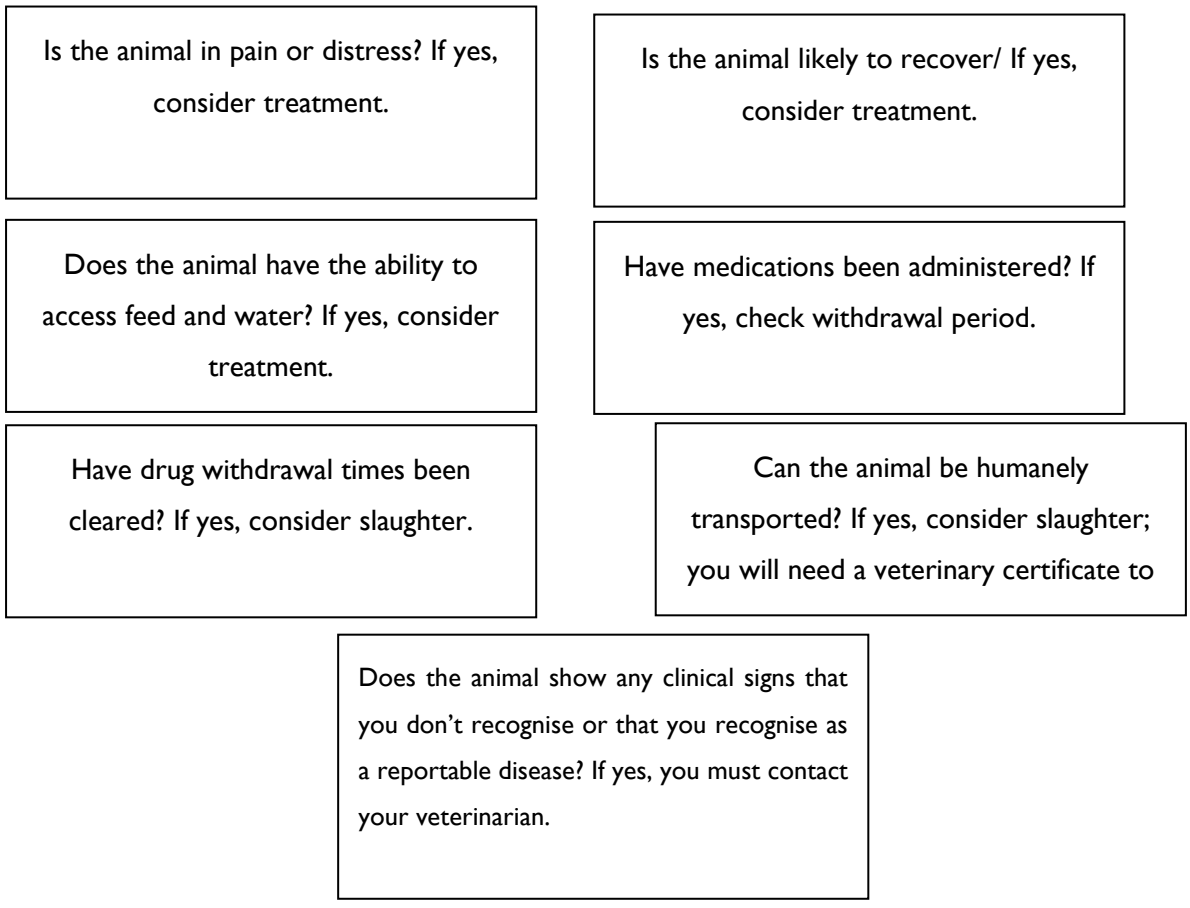
Kaolin (china clay), a white powder, can be mixed with water and given as a drench. Give 10 gm to a small animal and 200 gm to a horse or camel.

Euthanizing Injured Cattle and Predators and Discarding Of Carcasses

Sometimes cattle get injured very badly by predators or the cattle owner might come across a very badly injured predator (that might have been trapped or gored by bulls) and a decision will have to be made to euthanize the animals and discard of the carcass.

The decision to humanely end the life of an animal may be necessary in cases of severe injury (as well as injury by predators which didn't kill the animal) or disease or as a result of disasters such as fire or flood. On-farm euthanasia may be the most practical and humane way for a livestock producer to relieve an animal's pain and suffering if it is unfit to travel, or to prevent drug residues from entering the food supply.

Whenever possible, livestock producers should consult with a veterinarian before deciding to euthanize an animal. The following questions will help in deciding whether to treat, slaughter or euthanize an animal that is injured, extremely weak or disabled:



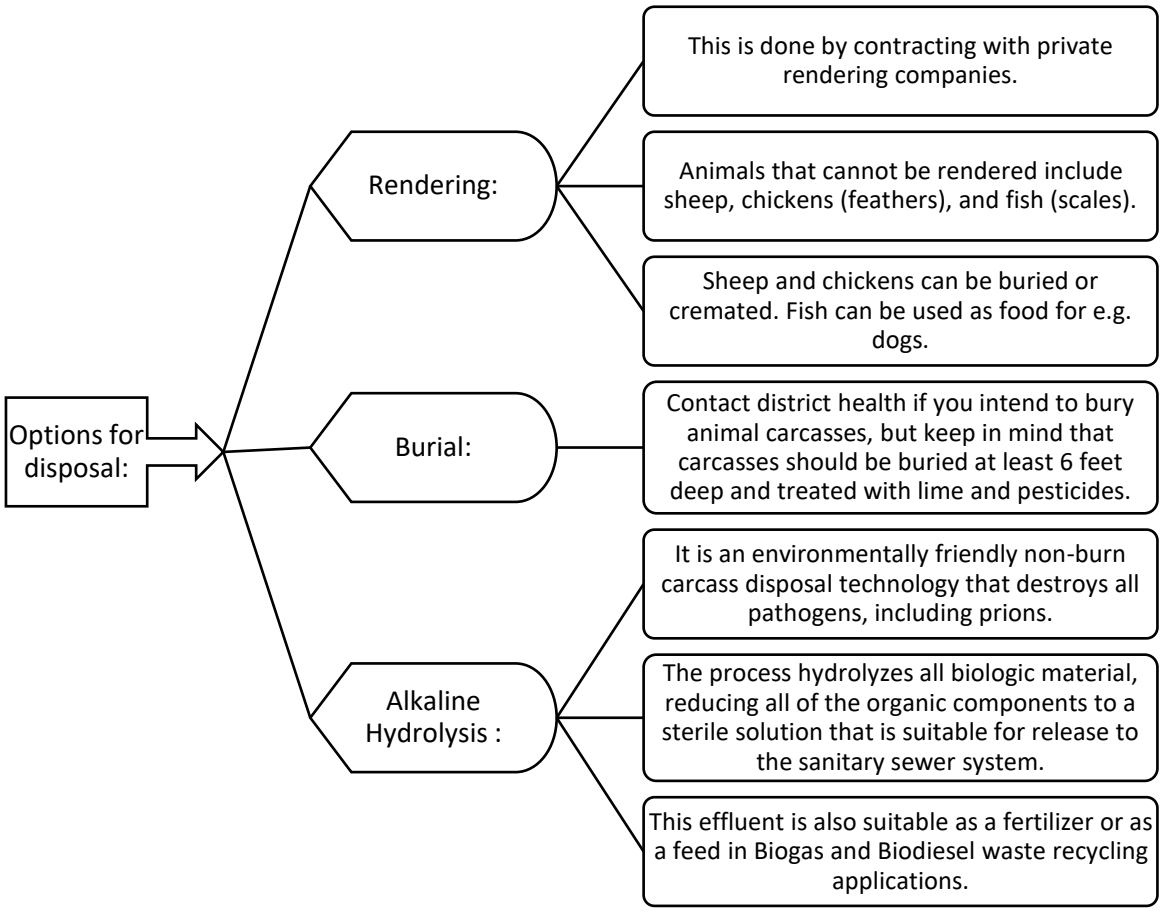
Disposal Of Mortalities

The proper disposal of livestock mortalities is critical in preventing environmental contamination and the spread of disease.

Producers are required to properly dispose of on-farm mortalities in a safe, environmentally friendly manner within 48 hours of death. When euthanizing an animal, it is a good idea to choose a location where you can easily reach the mortality and to quickly dispose of it.

Acceptable means of on-farm disposal include burial, incineration, composting, disposal vessels, or anaerobic digestion. Owners may also take deadstock to common bins, approved waste disposal sites disposal facilities, or to a licensed veterinarian for post mortem.

Animal carcass disposal can have a negative impact upon water quality. If not done properly, carcass disposal can lead to pollution or contamination of water intended for domestic use. Carcasses should be disposed of within 24 hours.



Skinning

When discarding of a carcass, you may decide to skin the animal to benefit from the hide (financially or for own purposes such as clothing and furniture).

There are many ways of skinning a carcass. The carcass may be skinned on a bench or hanging up. There are also various cuts that can be used.

Choosing a technique will depend on the size of the carcass and personal choice but the key element is about creating flaps of skin to pull.

For those who take pride in preparing a well skinned carcass, the end product should have no hairs on it, no bloody fingerprints, no knife marks, a striped bacon-like appearance on the back and flat joints.

Assist In Employer-Community Interactions In Addressing Problem Animal Incidents Adjacent To Protected Areas

Environmental protection requires that farmers and communities avoid destroying predators where possible and rather find alternative solutions to harming, hunting and poisoning these predators.

Where cattle farms are adjacent to wildlife sanctuaries and game farms, the farms must be sufficiently fenced off from one another, making use of e.g. electronic fences, game fences, razor wire, etc. It is important that the cattle farmer be alert to the dangers that these fences hold for his cattle and prevent them from electrical shock, cuts and strangulation near fences by keeping the heard away from such fences.

For farmers in areas with predators such as Lion, leopard, hyena and cheetah, one of the biggest problems is the loss of livestock to the predators. There are however a number of measures that can be taken by farmers to reduce the scale of the problem.

The first step is to identify the predators present on the farm or in the local area.

There is little point building expensive protection against lions for instance if there are no lions around. Spoor is a good way to identify what animals are in an area, as predators are often hard to spot.

The second step is to implement good livestock management techniques to reduce the risks from predators.

Good Livestock Management

One problem is that when a farmer finds a predator eating one of his livestock, then the automatic assumption is that the predator has just killed the cow, sheep or goat. In practice, if the farmer doesn't look after his livestock well and doesn't check for disease and get it treated, then animals will die from disease. If a goat for instance dies from illness and a hyena finds it, it will eat the carcass. The farmer who sees this or sees Hyena spoor near the carcass will assume the Hyena killed the goat, when in fact the Hyena is innocent. This means that farmers sometimes see predators as a bigger problem than they actually are. It is always easier for a farmer or farm worker to blame a predator than it is to admit that they didn't look after the livestock properly e.g. by checking for disease or bringing the livestock into the kraal at night.

Working with Nature not Against it

When raising livestock, it is easy to look on wildlife such as impala, kudu, and other herbivores as competition - after all they eat the same grass or bushes that the cattle and goats eat. There is then a temptation to try and get rid of the competition by either shooting the wildlife or driving it away. One problem with this is that predators will usually prey on wildlife species, but if these are not present then they are forced to turn to the farmer's livestock as an alternative food source. Tolerating the presence of wildlife means the predators have food sources that don't involve them attacking livestock.

POE Activity 14

POE Activity 15

POE Activity 16

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